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"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

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GAME REFUGES AND GAME MANAGEMENT ON THE NATIONAL FORESTS.*

By S. B. Locke.

The proper conservation of the game resources of the national forests under the present system of laws must depend largely on the establishment of a series of well chosen game refuges.

In a few cases Congress has established federal game preserves. A provision that such game preserves could be established by a presidential proclamation, when approved by the state involved, has been proposed and would be advantageous since some states have neglected to provide state game preserves.

State game preserves as established are not as stable as desirable, being in some instances frequently changed in size or location and occasionally based on other than sound reasons of game protection, sometimes including areas from which the stockmen have desired to exclude hunters to prevent disturbance of stock rather than to protect game.

Most of the western states have cooperated with the Forest Service in this matter and established such game preserves as have been recommended. Wherever state action is available it is possible to form immediately an effective system of such areas on the national forests.

Each game or bird refuge should be selected with certain definite objects. These will include one or more of the following:

*Adapted from Manual of Instruction issued to forest officers of the Intermountain district.

To prevent any species from reduction in numbers to such a point as will cause it to lose its value as a public resource.

To provide a place where all game can increase to a point where it overflows to adjoining areas, thus providing normal breeding stock thereon and increasing their value as hunting and recreation grounds.

To increase the game around summer recreation grounds and resorts, where this will increase their attractiveness and value to the public.

To provide a place for liberating and locating shipments of species which have been locally extinct, or are being newly introduced.

The selection of a given area as a game preserve depends largely on a consideration of the following factors:

1. Adaptability to specific species of game, preferably for the year-long season. The inclusion of year-long range is desirable but not essential. The protection of areas where game may concentrate before the hunting season closes, particularly in years of early snowfall, may make an effective game preserve where the range is occupied for only a portion of the year. Sometimes game may be so disturbed by hunters that it may drift out of large areas of suitable range and a game refuge will prevent this as well as provide protection from overshooting.

2. Necessity for preventing the extinction of rare species.

3. Absence of conflicting interests such as grazing, expanding settlements, etc. Exclusion of stock, especially cattle, is not a necessary condition for a successful game refuge in all cases. In most instances a normal stocking of cattle will not interfere with game. Sheep and goats may have to be excluded. It often takes several years for a game preserve to become stocked; there is usually an excess of summer range and areas unessential for game may be included in order to provide a practical boundary for protection so that the necessity of the exclusion of stock of any class will depend upon conditions in each individual case. The development of modern range management plans reduces greatly the possibility of conflict between stock and game. The presence of a limited amount of settlement will ordinarily not prevent a successful refuge unless there is unused agricultural land liable to result in demand for expansion of grazing privileges. In choosing game preserves it is desirable to avoid conflict with other interests wherever possible, but often certain adjustments in other uses are necessary if the game resources are to be conserved.

4. Geographic location with respect to the value of the refuge to surrounding areas as a source of overflow. A refuge so situated as to be valueless as a source of overflow is generally fulfilling only a part of its purpose. Factors preventing an overflow may result in conditions where actual overgrazing and overcrowding by game animals may exist even where there is no conflict with stock grazing. A necessary corollary to this proposition is that each refuge must be considered in position, size, purpose and administration with the system as a whole.

5. Desirability of increasing game around summer recreation grounds and resorts. There is an increasing appreciation and study of game animals by recreation seekers in such localities. The opportunity for such people to observe game animals increases their interest in and support of game protection besides being of educational value and furnishing additional recreational attraction to the forests.

Areas for bird refuges will be selected principally on the basis of the first, second and third considerations. Obviously the greater mobility of most birds renders the fourth consideration less important than in the case of nonmigratory game animals. Protection of birds on range occupied during the hunting season is more essential than the inclusion of range used year-long.

Except where descriptions follow posted boundaries of the national forests, it is preferable to describe proposed game refuges by definite topographic features which are much more easily recognized and posted than boundaries based on legal subdivisions or land office survey lines. In the absence of definite topographic features, such as ridges, streams or rock rims, roads may be used.

Whether or not game preserves are established, there are certain factors which will enter into any plan of game management.

The enforcement of the laws is a clear necessity and violation must be prevented. The entire plan of management will rely on this factor since it is dependent on protective laws. The problem is very much simplified by the selection of suitable laws and the utilization of public opinion.

A favorable public sentiment should by all means be fostered. In law enforcement, the support of at least a part of the local residents may make the difference between success or failure to accomplish the object. The backing of a local organization gives particular strength to protective laws. Where local laws are desirable, action taken to establish them should at least seem to originate locally. Even one sportsman in a locality, when convinced of the desirability of certain measures, may obtain support of signers on a petition by local people and in that case the possibility of the measure being effective is many times greater than if the law were sponsored by other than local people. Oftentimes the people in the cities are those who back fish and game protective measures; they generally constitute a large part of the hunters and fishermen, but the measures they propose will be most effective when there are local people or associations with whom they can keep in close touch and sympathy.

There has been a general tendency among hunters to not go far enough to accomplish results in game protection, the selfish feeling of not wanting to give up hunting for even short periods entirely influencing their judgment. It is true that the most progressive measures for wild life conservation have had their strongest backing by nonhunters such as wild life enthusiasts or women's clubs, and that the greatest opposition to game conservation measures comes from hunters themselves. In obtaining the interest of the public, the influence of nonhunters in wild life protection should not be overlooked.

An efficient policy of game protection and development should provide for the organization of sportsmen wherever possible. Such organizations are of inestimable value in influencing legislation and public sentiment and in assisting to make plans effective.

The personal example and the expression of opinion favorable to wild life conservation has considerable influence. The public should be educated to appreciate the value of fish and game or other wild life. This is shown by a statement of its value as a source of meat supply

or recreation for local people and the value in attracting and holding hunters from outside sections. The money spent by the latter class is an excellent index of the commercial value of this resource to the local community.

Conflict may arise between wild life interests and other activities, particularly the grazing use. The principle to govern action in such cases will be that of the highest use in each case, but the growing importance of wild life protection should not be underestimated. The adequate protection of wild life seldom requires serious curtailment of the grazing use but certain adjustments in the latter may be necessary to avoid creating conditions unfavorable to the maintenance of a game supply. Proper protection of the forests may require the establishment of open seasons such that fishermen and hunters will not be present during fire hazard periods.

A study of the forage requirements of game will govern the management of areas important for game production. It may be necessary to protect both summer and winter ranges or even to develop sources of winter feed. In the Jackson Hole country, it is necessary to provide hay for winter feeding of elk. There are certain sections in the Adirondacks where the wild hay is cut and stacked to be accessible to deer, when the snow is deep. The planting of wild rice or wild celery is very effective in providing attractive feeding grounds for ducks. The demand for seed of wild celery and wild rice for this purpose is so large that a business is made of supplying it. There is in most localities an abundance of summer range, but settlement or overgrazing of winter ranges has been the primary cause of the decrease of game. Particular attention should be given to this matter in the preparation of plans.

Hunting seasons should be established which will not interfere with the breeding, which will prevent waste of meat, which will not come at such a time as will place game at a disadvantage through driving them into poor winter feed country, and *which will allow restocking to continue.* The greatest amount of sport should be provided that is consistent with the preceding principles.

The importance of the destruction of predatory animals as a game protective measure can not be over-emphasized. In fact, this matter may mean the success or failure of game management, particularly where the numbers of game animals have been much reduced. Close observations of game conditions where predatory animals are numerous have indicated that great numbers of game animals are killed in the winter or spring when the snow is deep or crusted and where the young are just born. A mountain lion will kill one deer a day while feeding its young. The Biological Survey is accomplishing very much in destroying predatory animals and in many cases the states have been cooperating. Sportsmen and game protective associations should support actively every measure which will tend to reduce the number of predatory animals.

A recognition of the fish and game as a resource of the national forests carries with it the duty to administer it on the basis of a permanent production in as great a quantity as is consistent with the practice of forestry and the proper development of other forest resources. Through our cooperation with the states and our control over the use of the national forests, an opportunity exists for the development of practical game management which is impossible elsewhere.

REVIEW OF DR. SKOGSBERG'S REPORT ON THE PURSE SEINE FISHERIES OF CALIFORNIA.*

By W. F. Thompson and Elmer Higgins.

During the last legislative session the regulation of the purse seine fishery was a very live issue. The Commercial Fisheries Department had foreseen such a situation and during the preceding fall had assigned Dr. Tage Skogsberg of the State Fisheries Laboratory to make a thorough investigation of the purse seiners. Although completed in time for use by the legislature, the report has not been published and it has been thought best to give this advance review, the more so as there is a possibility of extending and completing the report during the coming year.

Dr. Skogsberg handled very completely a detailed analysis of the relation of the purse seine boats to the other fisheries for a period of six months of 1922. He was unable, for the lack of time, to carry this analysis through the entire year. He had at his disposal, however, a very considerable amount of data regarding the commercial catch during the last several years since the Commission has gathered data of the fisheries, and although this material did not separate the catches made by the purse seine boats from those made by other means, it assisted him in his conclusions very greatly. The presence of records of the catches of the individual boats will enable a complete analysis to be made at any time in the future, to supplement what is known from his report.

To the public unacquainted with our fisheries, some general information not provided in the report is essential to its understanding. Of the states, California leads the nation in tonnage of fishery products, yielding, during the three-year period 1919–1921, an average annual amount of nearly ninety-seven thousand tons of fish alone. California's fisheries are most concentrated near the great centers of population, San Francisco Bay region and Los Angeles County, but the southern part of the state, with one-third of the whole coast line produces one-half (50.9%) of the state's entire yield. Therefore, problems affecting southern California's fisheries have a greater proportionate importance than their aparently local nature at first indicates, and the threat of overfishing or the suspicion of wastefulness or inefficiency of methods warrants careful consideration and widespread popular interest. Dr. Skogsberg's report is, from this standpoint, of particular value.

As he says: "In the last few years the supposed destructive influence of the purse seine boats on the supply of fish in our waters has been much discussed among professional fishermen, as well as among other persons interested in southern California sea fisheries and their future, and articles to the effect that aliens were destroying the California natural fish supply by means of purse seines have repeatedly been published in the newspapers. ('For many of them,' the purse seiners, 'nothing is more pleasing than to enrich themselves at our expense and risk.') One of the main objections against these men is that they, by killing small fish in enormous quantities, are depleting the barracuda. There is a fairly widespread opinion that purse seining for barracuda, white sea bass and yellowtail should be prohibited in southern Cali-

*California State Fisheries Laboratory, Contribution No. 40.

fornia. A critical reader and listener could, however, not help being impressed by the looseness of the statements and by the fact that the complaints mainly are based on hearsay and only to a very little extent on personal and more or less systematic observations."

The need for care in coming to any conclusion as to the effect of purse seining is plain when their importance to the markets is considered. It is only common sense to be careful in rejecting a source of supply for the feeding of our fast increasing populations, and the need for steadiness of judgment is especially present when the plea is made that the conservation of that source is involved. (See Fig. 23.)

And Dr. Skogsberg clearly shows that "it is clear that the fresh fish markets to a very large extent depend on the purse seiners for their supply. Of the species of major importance to the fresh fish trade only the halibut and the rockfish are not taken by purse seines. Of the

FIG. 23. A purse seine boat at Municipal Wholesale Fish Market, Los Angeles Harbor. Photograph by W. F. Thompson.

remaining ones the mackerel is mainly caught by the small boats, the barracuda, white sea bass and yellowtail principally by purse seine boats. During the winter months the barracuda and white sea bass are almost exclusively landed by purse seine boats. Taking into consideration that the mackerel is a fish with relatively low market value and that the barracuda and white sea bass are high priced fish much appreciated by the fish-eating public, we are fully justified in saying that, without a more or less steady supply of the three last mentioned fish throughout the year, the fresh fish markets would not be able to furnish the public in southern California with a sufficient supply of desirable fish."

Not only is it true of the present, but it will be increasingly true in the future, that the purse seiners must be depended upon for a large part of the supply. "A process which has occurred in other older fisheries has begun here, namely, the outgrowth of the domestic supply by

the demand, so that fishing grounds farther away are being used. It will be interesting to see how far the process, which in Europe carries fisherman to the Barents Sea and to tropical Africa, can and will go." (Thompson, The Fisheries of California and Their Care, CALIFORNIA FISH AND GAME, Vol. 8, No. 3, p. 167.) "It is evident by now to almost everybody well conversant with the problems connected with our fishery industry that our local supply of fish for the fresh fish markets is very limited." (Dr. Skogsberg mss.) But, "the exploitation of distant fishing grounds implies the existence of a fleet of large sea-going fishing vessels, economical in operation and fit to carry big loads of fish (on ice, or otherwise preserved), long distances. What will be needed are vessels, large, speedy and economical enough to be able to operate with profit as far away as the Gulf of California and along the coast of Central America. We have, at the present time, in southern California, no vessels approaching this type more nearly than the purse seine boats; they are the only ones which, on a large scale, undertake fishing expeditions to distant waters (along the whole west coast of Lower California). The purse seine fleet provides the only hope for the future development of our fishing industry according to the principles outlined above. A great number of the present purse seine boats have a considerable cruising radius and carrying capacity and they show signs of development in these respects as well as with regard to economy of operation. The reduction of the cost of operation by the installment of crude oil engines, for instance, will probably imply a considerable increase of the radius of action of these boats."

Purse seine methods and gear.

It is naturally of importance to know something of the methods of the fishery which is under investigation, and Dr. Skogsberg briefly describes these, as follows:

"The term 'purse seine boat' has been used in this report in the restricted sense commonly employed in southern California, i. e., it refers to rather large boats generally of between twenty-four and forty-two gross tons, furnished with turntables upon which the seine is piled, and operating a seine of the type described below. The boats are about 65 feet long, 15 feet wide, 7 feet deep, and are powered with fifty to eighty-five horsepower engines using distillate, distillate and gasoline, or, in a few, crude oil as fuel. During the last few years the building of such a boat has cost between ten and fifteen thousand dollars; in exceptional cases as much as twenty thousand dollars has been paid.

"The crew consists of the captain and six or seven men when fishing for 'whitefish,' but during the tuna season one or two additional men are carried because of the greater size and weight of the tuna seine.

"Two purse seines are required, one for the catching of bluefin tuna and one for 'whitefish'; that is, barracuda, white sea bass, and yellowtail. The tuna seines are about 240 to 320 fathoms long and 23 to 34 fathoms deep, stretched web, and the web is stronger and has larger mesh than that of the whitefish seines. The latter are about 200 to 250 fathoms long and 12 to 24 fathoms deep, stretched web. A new purse seine costs on the average between $4,000 and $5,000. The web of the tuna seine, which is the most expensive part, must, as a rule, be renewed every season, and in the whitefish seine every other or third season. It happens not infrequently that smaller or larger parts of web and

ropes are lost by accidents caused by submarine rocks, strong currents, and so forth."

Dr. Skogsberg, in an appendix to his report, presents a careful and detailed technical description of a purse seine net, materials, construction, and use. To quote briefly, "* * * a purse seine is built like a long shallow curtain without any bag in the middle. Its upper edge is buoyed with numerous corks on a strong rope, the cork line, which keeps the seine floating with the cork line at the surface of the water. Its lower edge is weighted with numerous leads on a light rope, the lead line. * * * Along the entire length of the lead line there are a great number of uniformly distributed rings, the purse rings, fastened to the lead line with short ropes. * * * Through these rings runs a heavy rope, the purse line, the ends of which are tied to loops at the ends of the cork line. * * *

"The purse seine is piled on the turntable in the stern of the boat. A skiff is towed behind. When a school of fish is to be corralled, the skiff is released while the purse seine boat is running full speed, and its weight drags the end of the net into the water. As soon as the seine has been laid out in a huge circle around the school, the ends of the purse line are untied and the bottom of the net is closed with all possible speed by the pulling in of purse line, which is done by winch. The seine is then hauled in from the skiff end until the fish are concentrated in the bunt end of the seine, from where they are landed on the purse seine boat by means of a dip net."

History of purse seine fishery.

The reviewers have taken the liberty, for the sake of popular interest, of adding a few remarks, not contained in the report, on purse seine fishing in other localities, showing that this method is by no means a novel or local development in California.

The first purse seine is reputed to have been invented in the State of Rhode Island in 1826 and was used in the mackerel fishery. It was undoubtedly merely an improvement over the older types of gear then in use, but its success led to great expansion of the mackerel fishery, and it is now used extensively from Cape Hatteras to the bay of Fundy and the St. Lawrence. The net was soon adapted to the menhaden fishery and is now, and long has been, the chief means of capture of the menhaden throughout the middle Atlantic states.

The purse seine was introduced into Norway in 1878 by a Gloucester, Massachusetts, fisherman who went to Norway to engage in the annual mackerel campaign, and in order to compete with the Americans the Norwegian government distributed purse seines among its own fishermen, and had full descriptions of the gear published. The mackerel purse seines in Norway were soon adapted to the herring fishery, and that method is now one of the chief means of capture of that fish.

From Norway, purse seines were introduced into England, but they are used only to a limited extent in the West Country in fishing for pilchards (sardines). In other sardine fisheries of Europe, however, the purse seine plays an important part. In Spain the purse seine is the most efficient gear used, and in Portugal the purse seine ("cerco americano") and a kind of fixed gear yield the bulk of the catch of sardines in the winter and in the summer of *Caranx trachusus*, a relative of our "horse mackerel." In France alone are purse seines not

used, for there the introduction of improved gear in the fisheries is prohibited by law. Purse seines of the ordinary type along with "improved purse seines" are also used in Japan for the capture of mackerel, tuna, and sardines.

On the Pacific coast of America, purse seining has reached its highest efficiency in the great salmon fishery of the Puget Sound region, and in southeastern Alaska. From this, the southern California purse seine fleet has been largely recruited. That for the salmon is probably the oldest purse seine fishery in the West, and is reported by Cobb* to have been started in Puget Sound by Chinese in 1886. The first gas-powered purse seine boat was first used on Puget Sound in 1903, and the industry rapidly increased from then on, but a power boat of almost modern type was built ten years earlier at San Pedro and used for purse seining for mackerel, sardines, barracuda and other fish. The same method was used in the Monterey sardine fishery at the beginning of its modern development in 1903.

The report takes up the history at this point: "The purse seine fishery in southern California was begun as early as 1893. In that year the first purse seine boat, appropriately named 'Alpha,' was built at Los Angeles for operations in our waters. * * * In 1895 and 1898, two other purse seine boats were built at the same place, but they fished in southern California waters for a few years only. * * *"

Purse seine fishing on a relatively large scale was not started in southern California before 1915, when five boats, all built at Los Angeles, began operations. The following year two were built and in 1917 two more were added to the fleet. During these years barracuda, white sea bass, yellowtail, and mackerel were caught, but practically no tuna. Their success attracted fishermen from Puget Sound, and in 1918, eight purse seiners from the north arrived and with eight more locally built boats started fishing for "whitefish" and tuna as well, which proved quite successful.

Expansion in the purse seine fishery paralleling the war boom in other lines continued, reaching a peak of production in 1919, but continuing to expand in equipment until 1920. More boats came from the north, building increased at San Pedro and San Diego, and in 1920 between 100 and 125 purse seine boats were operating in local waters. In 1919, enormous catches of bluefin tuna were made, netting rich returns for the fishermen and boat owners, and the "whitefish" operations were equally successful. In 1920, however, the total bluefin yield was about one-third less than in the previous year, and the proportionate return decidedly less on account of the increased numbers of boats fishing. The yellowtail fishery fell, due to lack of demand, and the slight increase in the white sea bass and barracuda catch hardly balanced the season's failures. As a result, many boats returned to northern waters.

The reverses of 1920 were only aggravated by the failure of the 1921 season. Operations for tuna, barracuda, and yellowtail were unsuccessful and only the yield of white sea bass exceeded previous years. The number of boats operating was still further reduced and building was practically stopped. By 1922 only fifty boats were operating for tuna and, although the yield was somewhat better than the previous year,

*Cobb, John N., The Pacific Salmon Fisheries, Appendix III, Report of the U. S. Commissioner of Fisheries for 1916, p. 80. Washington, 1917.

only a few were comparatively successful; most of them did not even cover their expenses for equipment, upkeep and operations. The 'whitefish' fishery of 1922 was a moderate success, sixty-five boats operating during a longer or shorter period during the year.

Since 1920, a decided change has taken place in the ownership of the fleet. The amount of money invested in the purse seine boats in 1920 probably approximated two millions of dollars. The larger part of this money, representing life savings, was invested by the fishermen themselves. During 1920, 1921 and 1922, continued reverses were met by increased loans to meet operating expenses, and actual financial control of the boats and gear gradually passed from the fishermen to banks and canners, by means of mortgage, foreclosure and outright sale. At the end of 1922, only about half a dozen purse seine boats of southern California were independently owned. "This fact should be remembered when purse seine fishermen are denounced as aliens prospering at the expense of Americans.

"The decline of the purse seine industry in southern California was certainly not caused by the overfishing of the species on which it depends," as is shown in this report. Many circumstances have contributed to bringing it about which can only be enumerated here. "The cost of operation, which during the last years of the World War had become extremely high, showed little tendency to fall during 1919–1921. At the same time the intense competition between the many boats brought about a recurrent oversupply in the markets, causing a considerable decrease in the wholesale prices of fish. Strikes broke out among the boat pullers during the best seasons. Canned yellowtail proved to be unsuccessful in the market. * * * The bluefin tuna operations of 1921 and 1922 failed, probably due to natural fluctuations as well as moderate demand. It may be just to say that the purse seine industry became a victim of the economic crisis following the war boom."

Fishing ports, and relative importance.

As a means of estimating the relative importance of purse seines and other gear, and as a possible means of understanding various objections raised against purse seining, it is useful to consider the destination of the purse seiners catch. "Of the sixty-five purse seine boats operating in southern California waters in 1922, only two had San Diego as their home port, the rest belonging to the Los Angeles fishing fleet." Of course, the report continues, a fishing boat does not always deliver its catch at its home port, but it probably holds true that the fishermen pick as their home port the place where they can and do sell most of their products. Of the three species caught chiefly by purse seines, barracuda, while sea bass and yellowtail, 40 per cent of the total landings at the two ports, for 1919–1921 from local waters, was landed at San Diego, and 60 per cent at Los Angeles (Los Angeles County). The predominance of Los Angeles as a fishing port is further emphasized by adding the great Mexican catch landed in California. Of the average annual catch (1919–1921) of 3,323,000 pounds from Mexico, about 70 per cent was landed at Los Angeles, and of the bluefin tuna, caught almost exclusively by purse seines, Los Angeles County received in the same period practically all of the catch.

Obviously, the landings in Los Angeles are best adapted to an analysis of the purse seine activities.

Species caught by purse seiners.

Dr. Skogsberg considers in detail the relation of the purse seiners to the supply of the separate species, both those handled by the canners and those used fresh, limiting himself to Los Angeles County, for the reasons given above. Of those forms canned, the sardine, albacore and bluefin tuna are most important. Of those used fresh, the barracuda is much more important than other species, but there are also the California halibut, the yellowtail, the mackerel and the white sea bass. The purse seines play a very important or predominant part in the supply of bluefin tuna, barracuda, yellowtail and white sea bass.

Barracuda.

In most years, he says, the barracuda begins to appear in large quantities near the coast (inside the three-mile limit, often just outside the kelp beds), in the beginning or middle of March. During this month and especially in April, they are found

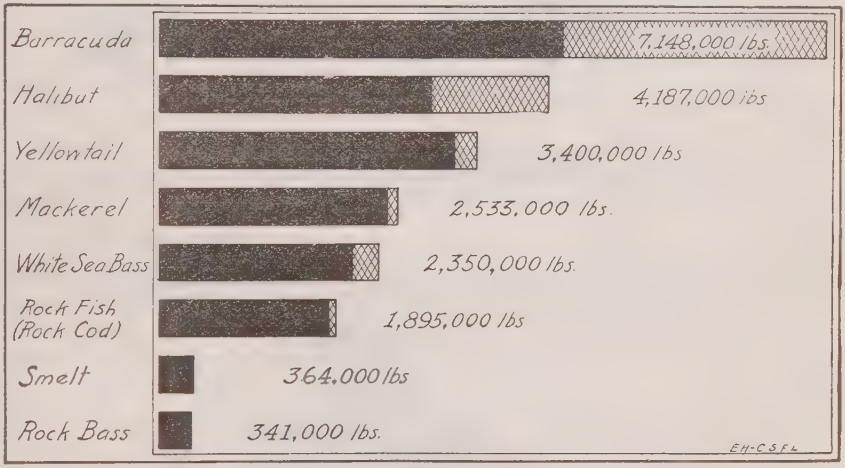

FIG. 24. Yearly landings of the more important market fish in southern California. Values are the average yearly total amounts for the period 1919–1921. Solid black, from local waters; shaded, from Mexico.

in very large schools, a fairly large percentage of which are less than the legal size, and they seem to be limited to a region between the Coronado Islands and a point midway between Oceanside and Point San Juan. Later in the spring these large schools appear to split into smaller units, and in May they begin to appear in other localities, as Newport, or San Clemente and Santa Catalina Islands, and at that time the spawning season begins. During June the climax of spawning is reached and during that month and July the fish are found along the kelp beds of the whole coast of southern California. Spawning takes place as late as August, at least, and during that month and September, or even later, the fishery is to the northward of San Pedro. During the winter months most of the supply is taken in Mexican waters, but there seems very little reason to believe that there is a migration to the southward from our waters, as occasioned catches can be made in them throughout the year, at times from very large schools.

The catches made each month are shown on the accompanying graph (Fig. 25), made from data given by Dr. Skogsberg, and it will be noted that heavy catches of local fish are made in April, May and June, but that during the balance of the year the large catches come from Mexican waters. It is pointed out in the report that the alternation of the local and Mexican supply is highly advantageous, and that the latter has been increasing at a rapid rate.

The relation of the purse seiners to the supply of barracuda has been carefully analyzed from statistical records of the Fish and Game Commission by Dr. Skogsberg for the first six months of 1922, and he supplements this by evidence gathered as to the remaining months from various sources. During January, February, March and April, as well as October, November and December, the purse seine fish form the greater part of the catch, varying from 96 per cent in January to 85

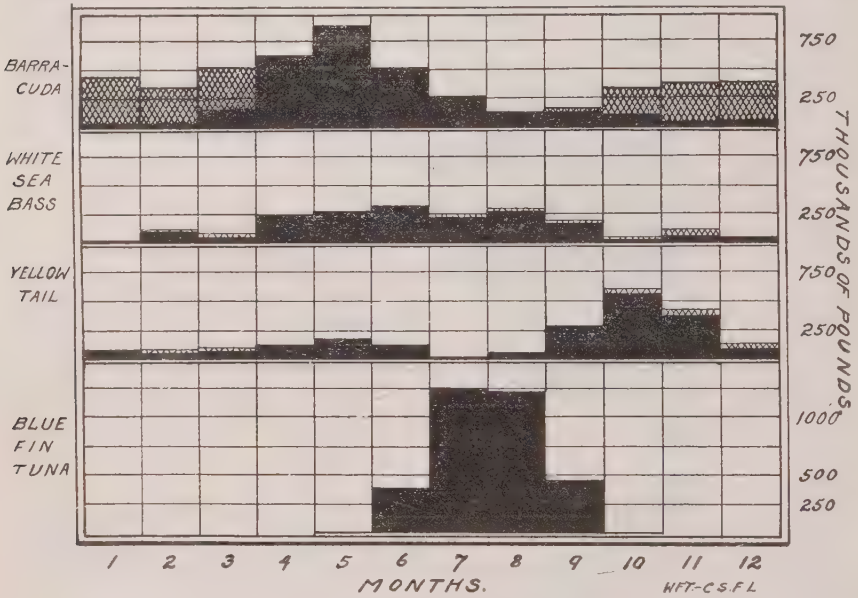

FIG. 25. Catch of chief purse-seined fish in Los Angeles County, according to months. Fish caught in local waters shown in solid black, those in Mexican, shaded. Quantities shown are averages for 1919, 1920 and 1921, save those for bluefin tuna, which are values for 1922 only.

per cent in March. This was mainly Mexican fish, not local, save during April. But during May and June, also during July and part of August, the small boats played the chief role, bringing in local fish only. "The small boats—the gill net and round haul boats—are capable of furnishing the markets at San Pedro with a rich supply of barracuda only from the middle of May to the middle of August. They depend almost entirely upon local waters for their catches. During the rest of the year the markets are absolutely dependent upon the purse seiners for their supply of this fish. The fish landed during this period is to a very large extent of Mexican origin."

It is especially noted that the months during which the smaller boats —not purse seiners—bring in their large catches of local fish are parts

of the spawning season, and that the purse seiners draw heavily on the local supply during April only. The purse seiners therefore, it might be concluded from Dr. Skogsberg's report, although he does not so state, are actually assisting in the conservation of our overstrained local supply of barracuda by equalizing the demand on Mexican and local waters, and by drawing upon the fish during the winter months. Only during April is this not true, for then large supplies of small local fish are taken by the purse seiners.

Dr. Skogsberg is, from a consideration of all available evidence, unable to see any promise that the small boats could replace the purse seiners during the winter months.

The white sea bass. The white sea bass fishery bears a certain resemblance to that for the barracuda. The six summer months, April to September, yield the heaviest local catches, and the catch is not as concentrated in point of time as is the local barracuda catch. During October, November, December and January the catches are small, particularly the local ones. As a whole, the catch of Mexican fish is relatively unimportant, the percentage varying in the years 1917 to 1921 from 3.5 to 19.9.

The purse seiners provide the greater part of the supply of white sea bass landed in San Pedro especially in the winter months. The percentages for the first six months of the year 1922 were: January 98 per cent, February 84, March 70, April 71, May 60, and June 11 per cent. During July the small boats still brought in large quantities, but during the remainder of the year the purse seine predominates. An estimate of 45 per cent of the total catch as of purse seine origin is not wide of the mark. The purse seiners do not, therefore, have the same importance in the white sea bass fishery as in the barracuda fishery. Nevertheless, they furnish the markets with very large amounts of white sea bass, and during the winter months they are almost the only ones landing this fish.

Yellowtail. The occurrences of the yellowtail is also in general similar to that of the barracuda, the fish appearing first in the southern districts, according to Dr. Skogsberg's information, but the maximum catch of yellowtail is in the fall, when the barracuda have become scarce. This may possibly coincide with the spawning season, but the data in his possession are not sufficient to lead to a conclusion. September, October and November yield the heaviest local catches. The summer months are relatively poor. Mexican fish plays a very small role at any part of the year, between 88 and 97 per cent being of local origin in the several months, but the Mexican supply is steadily increasing. Of the total of the species landed in San Pedro by far the greater part is brought in by purse seine boats, an even higher percentage, in fact, than in the case of the barracuda, and the importance of the purse seines is, again, greatest during the winter months. The remainder of the catch is landed, for the most part, by round haul boats whose gear resembles that of the purse seiners.

The bluefin tuna. The bluefin tuna fishery shifts to the north in a fashion similar to that of the barracuda and yellowtail, but begins in June, reaches a climax in July or August, and ends in September, making it a highly concentrated fishery. The species occurs in large schools which split up into smaller units

while feeding. No ripe spawn has ever been found in them. The purse seiners are almost the sole means of taking this species, which is so important to the canners of southern California. The loss of the catch would fall very heavily upon Los Angeles County canners, but the opinion is expressed that despite this fact the erratic nature of the catch and the low prices realized threaten to drive the purse seiners out of the business.

Purse seines and conservation.

In view of the detailed evidence which Dr. Skogsberg presents, it is evident that the destructive nature of the purse seine has been overrated. The individual fisheries considered show as yet no signs of overfishing which can confidently or even reasonably be laid at the door of the purse seiners any more than at that of any other method of fishing.

"The question as to whether the barracuda is being overfished can not, of course, be settled as yet, no scientific proofs bearing on the problem being available at the present time. A solution of this important question requires a careful statistical analysis of the catches of several consecutive years. Such investigations should be begun as soon as possible. * * * It is evident that the barracuda fishery of California has increased almost steadily from 1889 to 1921. * * * The total yearly catches do not indicate any decline in the natural supply. But the evidence from the increase of the total annual catch is too deceptive to serve as a basis for a conclusion that overfishing is not taking place."

"A shifting of the fishing grounds to more distant regions is often a sign of depletion of the home supply * * *, but * * * practically all the Mexican barracuda landed in southern California are caught during the season of scarcity of local fish; during April, May, June and July, when the local barracuda fishery is most successful, hardly any boats go to Mexico for their fish."

"There is, however, among the more intelligent barracuda fishermen and fish dealers at San Pedro, a very strong feeling amounting to conviction that the toll taken from the supply even now is too heavy and that the stock begins to show decided indications of decrease."

As is indicated in the report, the purse-seine fishermen can not be blamed with the possible existence of overfishing, any more than other gears can, such as the gill-netters, which take such great quantities of barracuda when spawning, and the roundhaul netters which operate in much the same way and with the same effect as the purse seiners. It is probably true that during the months of March and April large catches of undersized barracuda are taken by purse seiners. Dr. Skogsberg was unable to witness any of these and he believes them relatively seldom made. He points out that the question as to the relative value of these small fish in the conservation of the species is entirely unknown. In the great fisheries of Europe enormous quantities of very young plaice, cod, haddock, etc., are taken and marketed, and have been for a great many years. Almost every great fishery, in fact, is wasteful, as witness the halibut fishery in the north Pacific, where more fish are destroyed than are taken.

Furthermore, the fate of these young fish after being caught and liberated is unknown. The author is assured that, when not over-

crowded in the net, they survive. But when taken in too great numbers, or gilled in the meshes, they are undoubtedly seriously injured. He, therefore, believes that it would be a mistake to force the fishermen to use large meshes, but that, on the contrary, they should be allowed to use meshes too small to permit undersized fish to gill. This is the more true in that the gilling of fish must be avoided by the purse seiners because of the labor involved, and because of damage to the nets.

The evidence shows, on the whole, that the purse seines assist in conserving our local supplies by bringing fish from Mexico, and by catching winter fish, but that they are perhaps injurious during March and April, although even that is doubtful. They are least harmful during May, June, July and August, when the gill net fishermen take great quantities of spawning barracuda. The restriction necessary should be applied with these facts in mind.

In so far as the white sea bass fishery is concerned, Dr. Skogsberg found few complaints and his opinion is that the purse seiners do no more damage than do others. The proportion of small fish taken is not great, nor is there any feeling that depletion is occurring. About half of the total catch is taken by the purse seiners, and during the winter months as high as 98 per cent is landed by them. They do not bring, however, any great amount of Mexican white sea bass into Los Angeles Harbor. The same remarks apply to the yellowtail fishery, although in that case he calls attention to the fact that the great demand in 1918 demonstrated the rich possibilities of the fishery and conclusively showed the lack of overfishing in the following years.

The bluefin fishery shows no evidence of harmful fishing. "The decline in the bluefin fishery during the last two years may, to some extent, be explained by the low market prices, the possibly increased difficulties of catching the fish and the decrease in the number of the operating purse seine boats. The small number of years (six) during which the bluefin tuna fishery has been carried on, the shortness of the fishing season and the suddenness of the decline make it very improbable that the failure in 1921 and 1922 was caused by overfishing during the two preceding years."

One may summarize Dr. Skogsberg's findings by saying that the purse seines are on the whole no more harmful than other types of gear, and that their activities during the month of April, when they take great quantities of the smaller barracuda may be restricted by proper regulations. He also brings forward evidence showing that they are necessary types of vessels in tapping distant reserves of fish, thus relieving the strain upon our local supplies; that they provide the greater part of our winter supply of fresh fish, and that the whole of the bluefin tuna catch depends upon them. They are less harmful than beneficial, in so far as the conservation of our fisheries is concerned.

From an economic standpoint they meet with several objections, only one of which is dealt with in detail. This, the fluctuations in supply, and the resulting fluctuation in price, is disastrous to both the purse seiners and other fishermen, and is a defect inherent in any method of fishing which makes large individual catches. The correct method of dealing with this, the author and reviewers believe, is by the encouragement of cold storage facilities. The elimination of these fluctuations

would remove one of the prime causes of dislike among fishermen for this method of fishing.

The other causes of feeling against the purse seiners may be briefly enumerated, although not all dealt with in the report. There is the usual resentment of fishermen against new fishing methods, the uneasy feeling as to the permanence of supply that is generated in the layman's mind when he sees great individual catches of a species landed, the invasion by the purse seiners of districts reserved by law for the use of the sportsmen, and the fear that the nets in dragging the bottom destroy fish eggs and food. These things can not be dealt with here, although Dr. Skogsberg clearly shows that the latter cause of dislike is not justifiable.

The recommendations as to legislation suitable indicate that a close season during April and May would be effective in preventing the damage to small barracuda, which is the chief cause for the agitation against the purse seiners. Other measures possible and proposed are also discussed, and dismissed. A warning is sounded, that measures seriously injuring the purse seines will simply lead to the great development of the round-haul fishermen, who are indispensable in the sardine industry, but whose nets operate in the same general way and with the same damage to young fish as the purse seines.

The reviewers wish to emphasize Dr. Skogsberg's conclusion that there are a great many questions of a scientific nature still to be attacked before really final conclusions are reached with regard to the condition of our fish supply.

THE BAND-TAILED PIGEON IN YOSEMITE.

By M. Hall McAllister.

Thanks to the national parks and other game reserves where man, the great destroyer, can not get in his deadly work, our game birds and animals have a chance of surviving and becoming an asset for future generations. If fifty or one hundred years ago there had been throughout the Eastern States such game reserves, the now extinct passenger pigeon would still be in existence.

A great variety of birds and animals make their homes in places like Yosemite National Park. Some may be seen in broad daylight, others only at night. When visiting Yosemite it is a good rule, if you wish to see some interesting sights, to get up about a half hour before daylight, say 3.30 a.m. in June or July, and you will find a number of early folk to greet you. Some birds and animals appear at the first streak of dawn and disappear about 6 a.m., as soon as there is the least stir among the camps or dwellings. Visit the horse corrals which are along the north wall, east of Yosemite Falls, and you will probably find a flock of several hundred band-tails feeding there. Bands of deer may be seen in the meadows and glimpses of the furry tribe, including flying squirrels and weasels, may be enjoyed.

The band-tailed pigeon, a wild pigeon of Western States, is found in California the year round. It appears to be increasing in numbers, due to federal and state protection. In the Yosemite Valley pigeons are abundant and may be easily seen by visitors, provided they know how and where to look for them.

These flocks of wild pigeons seek the seclusion of the high trees on the walls of the valley during the day and, therefore, are but seldom seen by the daily visitors. A favorite habitat is on the tall cliff overlooking Vernal Fall on the south and occasionally a small flock can be seen as they are picking up grain on the road which follows the foot of the talus just under Sentinel Rock. This bird feeds largely on acorns, of which there is a plentiful supply.

During the winter months these pigeons do not leave the valley unless the storms are very prolonged, and then they apparently go a few miles down the Merced River canyon, but shortly return to their old haunt.

A very curious sight is sometimes seen during the winter. A large flock of band-tails may be roosting in a tree, when a heavy snowfall comes, which frequently continues all night without a breath of wind. This completely covers the perching birds and in the morning, when they are suddenly disturbed by a passerby, out they fly, causing a novel shower of snow.

The snowfall in the Yosemite is a remarkable feature of this attractive place. John Muir first called attention to the fact that the valley, or great gorge, which it really is, runs east and west, while the strong storm winds blow north and south. Therefore, while a hurricane blizzard may be piling up the snow on the heights, the fall in the valley comes down as gently as if it were at the bottom of a well. And so a heavy mantle of snow is particularly beautiful as it descends with but little wind and sticks fast to the trees and other objects, including, perhaps, a slumbering flock of pigeons.

Band-tailed pigeons are now breeding in various locations in the park. Their nests can be seen on the high cliffs overlooking Vernal Fall and among the pine and oak trees on the walls of the valley. It is a great satisfaction to know that these splendid birds have made their home in a protected area where they are safe for all time.

WHY CANADA AND THE UNITED STATES COMBINED TO STOP SPRING SHOOTING.*

By J. H. Fleming.

So much has been written about bird protection from the extreme point of view of the reformer that many men of moderate views have got the idea that protection spells total prohibition of shooting, instead of what it really means, the prevention of extermination, and the building up of the reserves of wild life to a point when the sportsman may feel that his future as a sportsman is safe under the regulations of the Migratory Birds Convention Act; while the same law acts as a check on the decrease of the nongame bird population of our country as well.

The extermination of wild life is not by any means confined to North America, it has been world wide, but possibly the results have been more clearly foreseen in Canada and the United States, and early enough to give hopes that with unity of legislation the word *exterminated* need only be written against a few of the birds and animals now in real danger of disappearing. And it is just in this lack of unity of laws (the question of enforcement is another matter) that Canada's efforts to restore the balance of nature by protective legislation is in danger. Animals are not subject to the impulse of migration to anything like the same extent as are birds. Provincial legislation is usually effective in their case, but local legislation for birds has repeatedly proved in the past to be ineffective as a protective measure. Birds pass from province to province and even from continent to continent in their journeys, and they suffer from local conditions as well as from international.

We in Canada are fortunate in that continental legislation is likely to prove a decisive factor in checking the downward movement of many desirable birds, but we must be unanimous, every province should legislate in conformity with the Migratory Birds Convention Act of the federal government of Canada if results adequate to the necessity of the case are to be obtained, and the case is urgent. We are not yet on the road to safety for our birds till every province conforms to the federal act. When that does happen we may then look to the United States to act with us, and we may then hope for the continental enforcement of an act that means results, both to the birds and to the sportsman, results that are bound to be beneficial to both. The convention is not the result of hasty legislation, but the carefully thought out effort of men who have seen the disheartening failure of laws that are purely local, and who know that nothing short of joint action by both the United States and Canada can be effective in building up the reserve of our bird life.

Migratory game birds such as ducks and geese may appear at times to be abundant in some one place, and the natural inference is that they are not decreasing, but the observer overlooks the fact that the old feeding grounds are not now as extensive, particularly in the West, as they used to be, and the birds are crowded into a smaller area. There have been many reasons given for the decrease of game birds. Spring shooting has harried them on migration and consequently they reach

*Leaflet published by Commissioner, Dominion Parks Branch, Ottawa, Canada.

their breeding grounds with less vitality than they ought, and they are apt to select the safest breeding grounds and often not the best. Many birds become barren and never reach the breeding grounds at all in consequence of the persecution they have experienced on their northern journey, and it is here that the direct benefits of the Migratory Birds Convention Act will be quickly felt. The birds will arrive in their full numbers and vigor and will select the most suitable breeding grounds, and in consequence the breeding range will be more extended and then, if granted sufficient local protection, there is no reason why there should not be a considerable increase in our migratory game within a few years, but we must give ample protection during the breeding season and local legislation has not in the past done this. It is only by joint action of the United States and Canada that protection over the whole breeding range of many species can be effective. The decrease of migratory game is so apparent that it is a matter of general knowledge, and fortunately the means to check it has at last come to our hands if we will only sink our local differences and accept the guidance of a central and well informed body whose duty it is to administer the treaty on behalf of Canada.

CALIFORNIA FISH AND GAME.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

October 10, 1923.

"The undoubted solution of the conservation problem is education, particularly of the young. Police methods, however, seem the sole means of controlling the hardened offender."

THE MOST NEEDED THING IN GAME CONSERVATION.

Fish and game administration is not a new thing. California has had a Fish and Game Commission, charged with care of the wild life resources, since 1870. Yet fundamental data that would be most useful in determining what toll can be taken of the various species has not been obtained. No one knows the average age of deer nor the natural death rate. Very little is known regarding the factors concerned in the increase or decrease of a species. Too often, emphasis is placed upon one factor alone, as, for instance, the predatory animals, when, in reality, there may be a multiplicity of factors concerned. Until we have dependable statistics as to the natural rate of increase and the normal death rate, it will be impossible scientifically to administer wild life resources. The most important data obtained in recent years has been that regarding the toll taken by the hunter. Several states now require every hunter to report his kill, and compilations are available showing the number of big game animals killed annually. How large a toll can be safely taken and still leave a sufficient breeding stock is still a matter of speculation. The most needed thing in game conservation is an intensive study of rate of increase and the death rate together with those factors concerned with these phenomena.

KLAMATH RIVER POWER PROJECT HEARING.

The hearing of the application of the Electro-Metals Company was continued before the Division of Water Rights the first of May, R. D. Duke, representing the Fish and Game Commission, one of the protestants. The appropriation was made by Carl Langford in 1908 of 500,000 inches of water flowing in the Klamath River or over four times the mean flow of the Klamath. The point of diversion was Ishi Pishi Falls, Siskiyou County. This appropriation was for the purpose of developing hydro-electric power for use in the reduction of ores in the production of aluminum.

The application of the Electro-Metals Company is for the purpose of having the time extended for a period of ten years within which to complete its proposed development and in order to justify the Division of Water Rights in granting such extension, it is incumbent upon the applicant under section 12 of the Water Act, that "the appropriator or user shall have proceeded with due diligence in proportion to the magnitude of the project."

At the time the appropriation was made there were no trails or roads, the nearest road being twenty-two miles or as far as Martin's Ferry in from the coast, and all materials had to be brought in on pack animals.

No roads were built by the appropriator and the only work done towards putting to a beneficial use this vast appropriation of water, outside of some surveying, was to bore a tunnel 1700 feet long, as yet incomplete. The original plan was to divert the water through this tunnel and through a canal to the proposed power plant below Ishi Pishi Falls, but since then, the appropriators have changed their plans and propose to construct a dam 250 feet high which would close the streams to the passage of salmon and sea-run trout and thus destroy this last large run of these species of fish in this state.

The state owns and operates a fish hatchery on Fall Creek, a tributary of the Klamath River, and an egg taking station at Klamathon where annually an average of five million sea-run trout eggs and twenty million salmon eggs, which are used not only for stocking the Klamath, but also other streams. If this permit is granted it means the end of this source of supply and the practical confiscation of the property of the state as it would become useless.

The Fish and Game Commission is protesting on the ground that this is the

last large run of salmon and sea-run trout in California for over ninety per cent of the spawning grounds have been destroyed by the hydro-electric power development, particularly on the Sacramento and San Joaquin rivers, and the only object of the Fish and Game Commission in protesting is to save these fish for the purpose of propagation and from extermination.

The government has constructed a road down the Klamath River which for miles runs through a forest reserve and is going to be one of the scenic trips of the state, the principal attraction of which is fish and game.

The application of the appropriator shows the power is to be used to develop a private enterprise in the manufacturing of aluminum and it does not seem possible that the time has come in this state when the people will suffer the last large run of salmon and sea-run trout to be absolutely destroyed by a private greed.

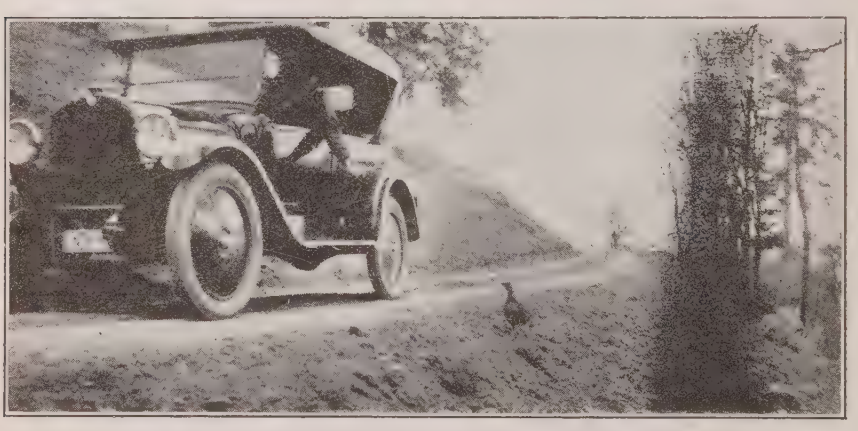

FIG. 26. A tame sooty grouse, Scott's Valley, Siskiyou County. Photographed April 24, 1923, by A. E. Culver.

BUREAU OF FISHERIES SUPPORTS COMMISSION'S STAND ON KLAMATH POWER PROJECT.

The following letter from Commissioner of Fisheries Henry OMalley supports the stand of the California Fish and Game Commission as to the feasibility of a fishway over a two hundred foot dam:

MR. W. H. SHEBLEY,

In charge, Department of Fish Culture, Fish and Game Commission of California, Sacramento, Cal.

DEAR MR. SHEBLEY:

I acknowledge the receipt of your letter of March 27 and note that your Commission is endeavoring to amend the present fishway law of California so as to enable the Commission to use its judgment in regard to establishing hatcheries in lieu of fishways when in their judgment the dams are placed too near the mouths of the rivers, so that salmon can not properly mature their eggs when intercepted that low down on the river.

I further note that a statement has been made to the effect that the Bureau, or I, have approved of a fishway proposed by the Electro-Metals Co. I want to say to you very decidedly that I have not approved any type of fishway. I have consistently adhered to the statement that it is practically impossible successfully to pass adult salmon over a dam or obstruction of a greater height than 30 feet. There are one or two instances where they do go over a dam higher than this, but the cases are rare, and none of them exceed 40 feet.

The dam of the Portland Railway, Light and Power Company, located at River Mill, Oregon, is something over 100 feet in height, if I recall the figures correctly, and to my personal knowledge, borne out by the statements of Mr. Mitchell, our superintendent at Clackamas, Oregon, station, we have never known a salmon to successfully negotiate the fishway. During the season when we are operating for eggs below the dam we do not even take the trouble, in recent years, to blockade the fishway because it presents a sufficient barrier in itself. This fishway was constructed by the Portland Railway, Light and Power Company in good faith and from the best plans available at that time, but it has not proven a success.

The proposal of the Electro-Metals Co. to construct a fishway in rises of 30 or 40 feet, and then establish small lakes or resting pools is an entirely new plan, and it would be impossible for me to state whether or not it would prove successful, but I would not want to recommend it for a river which is supporting a commercial run of salmon that would be destroyed if it were not to prove successful. It seems to me that it should first be attempted on some unimportant stream to find out whether the plan would be practicable.

We have one or two men in the Bureau who are studying fishways with the idea of attempting to develop something that is practical for the high dams which are under contemplation at various points, but up to the present time nothing that approaches a satisfactory device has been suggested.

If you desire to use this letter officially, you may do so, and I shall be glad to give you any other information which we have available at the Bureau.

Very truly yours,

HENRY O'MALLEY,
Commissioner.

IN MEMORIAM.

WILLARD ODION FASSETT.

Willard Odion Fassett departed this life April 10, 1923. He was a son of the late Thomas Odion Fassett, U. S. N., and Susan Knight Fassett. He was born April 4, 1862 at Brooklyn, New York, and came to San Francisco with his parents in 1867. Later the family moved to Vallejo.

Mr. Fassett graduated from the Vallejo High School in 1879. Shortly after this he entered the service of the United States Navy as a machinist apprentice in the steam engineering department at Mare Island, where he completed his apprenticeship and was employed for a number of years at the trade in the government service. He was a lover of nature and the great out-of-doors had a fascination for him.

He entered the employ of the California Fish and Game Commission as an apprentice fish culturist in 1896 at the Battle Creek salmon cultural station. Thereafter he took an active part in all departments of fish cultural operations, having been employed as foreman of the Commission's egg collecting station at Verdi, Nevada, as foreman and assistant in fish cultural operations under E. W. Hunt at the Tahoe stations, and as messenger in distribution work and other capacities at the Sisson hatchery, Klamath River stations and other hatcheries and egg collecting stations. Mr. Fassett was appointed superintendent of the Price Creek Hatchery in Humboldt County in 1900, where he was in charge during all the years that this station was in operation. It was a hard station to operate

W. O. FASSETT.

owing to the friable nature of the soil through which Price Creek flowed forming immense deposits of earthy matter in the water supply that caused many days and nights of anxiety on his part lest the fish and eggs in his charge be destroyed.

When the Price Creek Hatchery was abandoned in 1915 and the new hatchery near Ft. Seward established, Mr. Fassett was placed in charge of the new station. In 1920 Mr. Fassett was placed in charge of the northwestern division of the Fish and Game Commission's fish cultural operations, which included all the stations in Mendocino and Humboldt counties, consisting of Ft. Seward Hatchery, Ukiah Hatchery, Snow Mountain Egg Collecting Station and the experimental station near Branscomb on the South Fork of the Eel River. Mr. Fassett continued in charge of these stations until the date of his demise.

Mr. Fassett was a loyal and faithful employee of the Fish and Game Commission. He never neglected the most exacting duties connected with his work, always having in mind the success of his undertakings. His knowledge of the natural history of the different species of fishes that he handled in his work was of great value to him and assisted greatly in the success that he made of his fish cultural work. His mechanical training was of great assistance in the construction work at the different stations that were under his charge. Untiring in his efforts in all lines of fish culture, conscientious and dependable at all times, he was one of the old, faithful employees of the Fish and Game Commission, who made the work of the Commission known all over the country for its efficiency.

Mr. Fassett was married to Mary E. Weymouth in San Francisco, September 3, 1899. He leaves to mourn his loss his wife, one son, Weymouth Fassett, two brothers, Thomas and Philip Fassett of San Francisco, besides a host of friends, for his genial nature, generous disposition and his charity toward all men made him loved and respected by all who knew him.

In the passing of Willard Fassett the state has lost a good citizen, his wife and son a kind and loving husband and father and the Commission a dependable and faithful employee. W. H. S.

THE STEINHART AQUARIUM.

It is gratifying to the Commission, and will doubtless be of much interest to our readers, to know that the splendid new Steinhart Aquarium in Golden Gate Park, San Francisco, is to contain a demonstration hatchery for use by the California Fish and Game Commission. Ever since its organization in 1870, the Commission has been very active in introducing new species of fish suited to various local conditions, and in the artificial propagation on a large scale, of both the introduced and the most desirable native species of food and game fishes. Valuable scientific studies in the life histories of many species and in the problems of conservation and propagation have been conducted by the departments of commercial fisheries and fishculture in this connection. Some of the most important of these investigations are now in progress. The purpose of all such activities is to perpetuate and to increase the value of California fisheries, as well as to meet the demands of an increasing population of anglers for the delectable sport of fishing. Results of the Commission's efforts along this line have been probably the most successful ever recorded by any state in the Union.

This miniature hatchery in the aquarium is to be well equipped for showing all of the processes, methods and practices used in the artificial hatching and rearing of fish. The Fish and Game Commission expects to cooperate by detailing one of its fishcultural experts to take charge during appropriate seasons and to give information. It is anticipated that this feature of the aquarium will be much enjoyed and appreciated by the thousands of persons who will visit the numerous exhibits.

A biological laboratory, equipped so that investigators, professors, high school teachers and others may come and study any problems in which they are interested and which can be studied with aquarium material, is also a part of the aquarium plan. This offers a resource of much value to teachers and their students and one which it is hoped will be widely used.

We are pleased to present the following description of the aquarium and a brief history of this gift to California:

"Construction work on this aquarium, which was begun in April, 1922, will probably be completed early in July. The California Academy of Sciences has already begun collecting and placing in the tanks and pools the fishes and other aquatic animals that will constitute the permanent exhibits. There are in the stock tanks now, quite a number of aquatic animals of various kinds including one small California sea lion, one horseshoe crab, some thirty turtles, representing eight different species from Lake

Maxinkuckee, Indiana, and numerous aquatic reptiles and amphibians from the states of Washington and Texas, including a three-foot alligator from the latter state. To assemble and install the exhibits necessary fully to stock the aquarium will require a month or longer, but it is hoped that the installations will all be completed and the aquarium ready to open to the public within a few months.

"There are 57 large tanks, about 40 smaller balanced aquariums or tanks, one large indoor tropical swamp, and five large outdoor pools for sea lions, fur seals, leopard seals, porpoises and fishes too large to put in the indoor tanks. Both fresh water and salt water fishes will be shown. Four kinds of water will be used. There will be tanks with fresh water of the local temperature for local fresh water fishes, and others with fresh water cooled to suit trout, salmon and other cold water species. Then there will be other tanks with salt water of the local temperature for the salt water species of our coast, and other tanks with water heated to suit the gorgeously colored tropical fishes from the Hawaiian Islands. About a dozen large tanks will be devoted to tropical species.

"The indoor tropical swamp is the first thing that will attract the attention of the visitor as he enters the building. This swamp is on the main floor and is about 25 by 45 feet. The side opposite the visitor will be a moss-covered bank down which water trickles gently and artistically. At the other side the water will be two or three feet deep. Lying about in the swamp will be several old moss-covered logs, stumps and rocks on which turtles, watersnakes, frogs and salamanders can crawl out. And there will be aquatic plants of various kinds growing in the swamp, while ferns, climbing vines and other suitable plants will cover the walls to a height of 30 to 40 feet on three sides of the swamp, and from the skylight girders above the swamp will be suspended orchids and other beautiful tropical epiphytes.

"In the 57 large aquariums and the 40 or more smaller ones it is hoped to show a great many of the most interesting and important fishes found on the west coast of America and in the Hawaiian Islands, as well as many kinds from other countries. It is also the intention to show as many species of turtles, watersnakes, frogs and salamanders as possible, including the water-dog from the Great Lakes, the alligator snapper from Arkansas, and that strange animal from the Mississippi River, the hellbender, or, to speak more reverently, the "sheol curver."

"For this great educational institution, San Francisco, the Bay region and the entire state are indebted to Ignatz Steinhart, banker and philanthropist of San Francisco, who died May 15, 1917. In his will Mr. Steinhart left $250,000 to the California Academy of Sciences for a public aquarium on condition that it be located in Golden Gate Park adjoining the Museum of the California Academy of Sciences and the 'management, superintendence and operation be in charge and under the direction of the California Academy of Sciences.'

"The executors, Mr. Jesse W. Lilienthal, Jr., and Mr. John I. Walter, paid over to the Academy the full $250,000 in one check in December, 1919, and the trustees of the Academy loaned the entire amount on the day it was received at a good rate, the interest payable monthly. Whenever an interest payment was received the amount was invested in government certificates, with the result that more than $53,000 interest has already accrued.

"Mr. Steinhart originally planned to put $75,000 to $125,000 into the aquarium building and its equipment. But the larger amount named in his will and the business-like handling of the money by the board of trustees of the Academy has made it possible to put $303,000 into it, and to provide a very much larger, better equipped and more beautiful aquarium than was originally contemplated or possible.

"Dr. Barton Warren Evermann, the director of the musuem of the California Academy of Sciences will also be the director of the Steinhart Aquarium, and Mr. Alvin Seale, director of the Manila Aquarium for several years, will be superintendent and in immediate charge.

"Mr. Steinhart had for several years contemplated establishing a public aquarium but finally practically abandoned the idea until Dr. Evermann had an interview with him on March 8, 1916, at which time Mr. Steinhart said that he had met with so many difficulties of one sort or another that he had abandoned the aquarium idea and had about decided to devote the money to another and entirely different purpose. Dr. Evermann left him that evening with the feeling that there was no hope of Mr. Steinhart ever giving any money for a public aquarium. But two days later Mr. Steinhart telephoned Dr. Evermann to come and take luncheon with him at the California

Market. The invitation was, of course, accepted and almost the sole subject of conversation during the luncheon was aquariums. Other luncheons followed at rather close intervals. On April 5th, Mr. Steinhart stated to Dr. Evermann that he had finally decided to establish an aquarium in Golden Gate Park and under the California Academy of Sciences, and on September 13, 1916, at an aquarium luncheon held at the Palace Hotel, at which Mr. E. O. McCormick presided, Mr. Steinhart made the first public announcement of his decision.

"From that date the matter moved rapidly. A charter amendment was adopted by the city and county of San Francisco which authorizes and directs the board of supervisors to provide in the budget and to pay over to the Academy of Sciences the funds annually required for the maintenance of the aquarium.

"San Francisco and the entire state are to be congratulated on the prospect of early completion of such a useful educational institution as the Steinhart Aquarium is sure to be. What a fine thing it was for Mr. Steinhart to make this possible! What a splendid and enduring memorial the Steinhart Aquarium will be! The name of Ignatz Steinhart will ever be held in grateful remembrance."

IT ALL HELPS.

Although we many times hear of readers of CALIFORNIA FISH AND GAME who pass on their copy of the magazine to others to read, it has been seldom that we have met the enthusiasm shown by a motorman of San Francisco who recently stated that upon the receipt of CALIFORNIA FISH AND GAME he reads it from cover to cover, allows his wife to read it, and then his son. After home consumption, he sends it to a teacher in a country school in northern California with the request that it be returned. Upon its return, by this time rather worn and soiled, it is finally forwarded to a friend in Michigan.

Successive attempts to eliminate a large number of those receiving the magazine and consigning it to the wastebasket have shown that 96 per cent of our readers actually read the magazine and invariably find and return the postal card which assures their continuance on the mailing list.

HAWK AND OWL BOUNTIES.

In a leading editorial, "Evils that Lurk in the Bounty System," *Bird-Lore*, Vol. XXV, No. 2, March-April, 1923, makes a strong appeal for discrimination between the harmful and the beneficial species of birds where bounty laws are in operation or are being advocated. It is pointed out that for many years it has been the custom in western Europe to employ keepers, for the private game preserves, whose duty it is to destroy birds or animals which prey upon the game within the preserves. Such birds or animals are usually classed as "vermin," and include hawks, owls, rooks or any bird which is thought to be destructive to game.

This custom is also in more or less general practice in this country and its influence is seen in the agitation for "bounty laws" in various state legislatures. Some states have such laws in operation, as for instance, Virginia, which pays a cash reward on hawks, owls and crows. Of course, it is but natural that these birds were indiscriminately condemned in Europe a century ago because scientific investigation had not then determined the food habits of the different species. Now, however, through studies made by the United States Department of Agriculture, Bureau of Biological Survey, it has been found that really a small minority of these birds prey upon game birds. Of the 19 species of hawks and 21 species of owls in North America, the sharp-shinned hawk, Cooper's hawk, goshawk (not abundant), the great horned owl and the snowy owl are the serious offenders. The Biological Survey has gone on record as not approving the bounty systerm, but even if it were considered a good thing for really destructive birds or animals, why should public money be paid for the killing of the many species of hawks and owls that live almost entirely upon grasshoppers, mice, rats, gophers and other pests that work havoc upon the crops of the farmer and orchardist.

The bald eagle, emblem of American independence, is also among the unprotected birds in some states. In Alaska, where the eagle is very abundant, it is stated that more than 18,000 eagle bounties have been paid. If we must have bounty systems, why can not the bounties be confined to the birds that have been proven to be detrimental to game or insectivorous birds. With all of the literature available on the subject, there is no reason why anyone should not be informed as to the harmful and beneficial species. Bounties, if paid at all, should be paid only on the undesirables.

GAME LAW ABSTRACTS.

It has been the custom of sporting goods houses to issue small cards giving an abstract of the game laws. In order to have these cards ready for the angling season they are rushed through before an authentic synopsis of the new laws has been made by the Fish and Game Commission. As a result, serious mistakes are made and the Commission has the greater difficulty in law enforcement. Several new laws were placed upon the statute books by the 1923 legislature and every sporting goods house planning a game card should obtain an official tabulation from the Fish and Game Commission.

RABBIT HUNTING AND QUAIL.

Southern California is greatly disturbed over the quail situation. In the early days, the valley quail was a very abundant bird, but the species seems to be disappearing all through the southern counties. Doubtless, there are many causes for this decrease, the destruction of food and shelter being, perhaps, the prime cause. Among the minor factors concerned may be pointed out the situation which southern California still maintains as regards rabbits. Although northern California some years ago gave protection to the rabbit so as to give no excuse to anyone to have a gun in the field before the opening of the quail season, southern California, on the other hand, has persistently requested no protection for rabbits on the plea that they were very destructive to crops. As a result, law enforcement has been difficult and the alien gunner, with the constant excuse of "hunting rabbits," has been able to kill quail out of season. On the statute books the rabbit continues to hold a unique position—in one section it is branded a destructive animal and given no limit, yet in another section limit laws hold and sentiment favors protection.

FIG. 27. Whistling swans feeding in rice stubble fields near Richvale, Butte County, November 19, 1922. These birds were particularly abundant in the Sacramento Valley last winter. Photograph by George Thompson.

VIOLATORS MOSTLY FOREIGNERS.

Scan the list of game law violators and it will be found that a very large percentage of them are foreigners. In fact, 75 per cent of the violations are either willful evasions by aliens or are traceable to ignorance. The most effective remedies are an alien gun law and education. These measures would greatly aid law enforcement and effectually reduce violations.

An educational program has been adopted in California but the alien gun law, found so useful in other states, is not to be found on our statute books.

STRIPED BASS IN OAKLAND LAKE.

During early March, while dredging operations were in progress at Lake Merritt, Oakland, the gates which govern the tidewater used in forming the lake were closed for a time. A large number of striped bass which had found their way into the lake from the creek were shut off from exit and soon sickened in the brackish water of the lake. Fishing for them was popular at first, but those taken were unfit for food and, therefore, at the suggestion of the Board of Health, all permits for fishing were rescinded. Fish of four or five pounds in weight were taken.

DO NOT MOLEST FAWNS.

The formal opening of the vacation season in California was celebrated with the opening of the trout season, and mountains and woods and streams extend their invitations. Camp outfits have been assembled and the exodus to the great out-of-doors has begun; daily this movement gathers impetus, and in but a short space of time tourists will have taken possession of all of the favorite campsites in the whole mountain area of California.

The deer, too, are now leaving their winter quarters in the sheltered places below the winter snow line and are following the receding snows to the higher altitudes where they will take up their summer homes. And, arriving on the summer range, the deer family will set up the manner of housekeeping that is peculiar to their kind.

Male deer all shed their horns during the winter and the principal business of the buck during the summer is to grow another set of antlers that may adorn some hunter's den this year, or be the foundation for some of the stories that only a deer-hunter knows how to tell. The older bucks soon leave the other deer and seek solitude in the high inaccessible mountain regions where they stay until after the opening of the deer season, and the coming of the hunter.

Does and yearlings remain in the little mountain valleys and glades and along the streams and near lakes. It is here that the fawns are born, each doe raising one or two; protection and conservation of the yearly 'crop' of fawns is absolutely necessary if the sport of deer hunting is to be perpetuated.

For the first few days after the fawn is born the mother deer will place her baby in some secluded spot where it will lie and sleep most of the time—the mother deer will go away, but will return to feed her baby periodically. The tourist wandering through the woods, or the angler along the stream may, perchance, happen upon a newly-born fawn. Immediately he is intensely fascinated at the sight of the little fellow, for while the young of all wild animals are attractive, none is more beautiful than the fawn. The little warm ball of soft, spotted fur, the small slender nose, the restive ears and the large wistful eyes are irresistible attractions; and many a person after gazing on this beautiful creature is possessed by the desire to have—and to hold. However, the law injects itself at this point and says specifically that every person who takes or has in his possession any spotted fawn is guilty of a misdemeanor, and, upon conviction, shall be fined in a sum of not less than $50, or sentenced to jail, or both.

While occasionally a fawn may be left an orphan, such instances are rare. A very young fawn may appear to be "half-starved," but such is not the case and the youngster soon acquires sufficient strength to accompany the mother. Provision is made by Mother Nature to protect the little fawn from predatory animals for the scent sacs are not developed for a number of days after the fawn is born; during which period a good deer dog may pass within a few feet of a fawn without being aware of its presence, as there is no scent.

From time to time, certain well meaning but misguided persons will pick up a little fawn discovered in the woods believing it to be abandoned because the mother deer does not happen to be in sight at the moment, and such person will then write to the Fish and Game Commission for a permit to keep the animal. This can not be granted.

While on your trip to the mountains, should you be so fortunate as to see a young fawn you should appreciate your privilege to look upon one of Nature's most wonderful creatures, and you should be grateful and go away without disturbing the little animal. Reducing any deer to captivity is not desirable as most people soon tire of a deer as a pet, for the affections of an adult deer are decidedly fickle. But when the animal has once been kept a captive it can not be liberated again for it has lost its fear of man and can no longer take care of itself; thus, the deer which has been picked up as a little fawn must be retained in captivity all of its life; which is certainly an ignominious existence for so noble an animal.—Roy Ludlum, Sacramento, California.

A WARNING.

After every session of the legislature, hunters and anglers find themselves in serious trouble owing to the fact that they have not secured correct information regarding new laws passed. The newspapers, in reporting new laws passed by the legislature and signed by the Governor, do not explain that these laws do not go into effect until 90 days after the close of the legislature, which this year ended May 18th. In spite of statements to the contrary, the trout limit remains the same and relatively few changes in laws went into effect on August 17th.

this game bird. That a real toll is annually being taken of the predatory species is evidenced by the accompanying photograph which shows the results of the 1922 season. In all, 120 animals were taken, as follows: coyotes, 10; cats, 24; coons, 16; foxes, 4; opossums, 20; skunks, 38; civet cats, 5; squirrels, 3.

Last year on an area of 10¼ square miles, 84 predatory animals were secured. Attention is called to the large number of opossums, which demonstrates the fact that this is now a common animal on the peninsula, although introduced into this state as recently as 1910.

FIG. 28. Catch of fur-bearing mammals on the Spring Valley Water Company property in San Mateo County, season 1922–23. One hundred twenty pelts in all. Note the twenty opossum skins. Courtesy Spring Valley Water Company.

WATER COMPANY DESTROYS PREDATORY ANIMALS.

The Spring Valley Water Company has been doing systematic trapping on its properties in northern San Mateo County for several years past. This constitutes an interesting trial of the much vaunted value of the control of predatory animals as a means of increasing game, for no hunting is allowed on the properties and there should be an opportunity to determine what relations exist between the predatory animals and game.

Valley quail were once very numerous, and the trapping operations have been instituted largely as a means of increasing

A DEFENSE OF THE COYOTE.

In eastern Oregon, where the coyote has been hunted by federal officials for the past several years, the jackrabbit has grown so abundant that since 1911 it has taken at least 10 per cent of all the crops suited to its food habits. This applies, of course, to the sections along the stock growing belts where alfalfa is the chief forage crop.

In 1911, I began to take the matter up with the federal authorities, and was told that an epidemic would soon give us all the relief we could ask for. There were two slight "waves," when the rabbits were somewhat reduced in numbers, but

they were back to normal within a year each time. Ground squirrels were nearly as numerous as the rabbits, but did not destroy as much because of the fact that they do not work all year.

As for the damage done by the coyote, I believe that it is not nearly as great as is claimed, and this seems also to be the opinion of some stockmen. The manager of one of the largest sheep outfits in the world has stated to the writer that the coyote is responsible for some 8 per cent of the losses among sheep. He also said that the greater part of this loss was sustained during May, the breeding season of the coyote, and that if the herders would take better care of their flocks, much of this loss could be avoided. I have several times found, in cases where heavy losses were being claimed, that the sheep were bedded down in an exposed situation, with the herders and the dogs sleeping a mile or more away from their charges. This gave the coyote ample opportunity to help himself.

The killing off of the rabbits by poisoning has been a total failure in the section where I took my notes, although it was tried several times. I am convinced that the best check is the coyote, which Nature has placed there to keep down just such pests. I hold no particular friendship for the coyote and am willing to admit that in some parts of the country it should be reduced or driven out; but in the above mentioned locality, as well as in other sections of the northwest where the rabbits and ground squirrels are the greater pest, I have no doubt that the coyote is the rancher's best friend and that many of them so regard it. Its killing is a double tax on the country and I do not understand why it is not looked upon in this way by the government.—A. W. Anthony, San Diego, California.

THE FUTURE OF ANGLING IN THE SAN JOAQUIN.

The power companies which are responsible for the great dams which keep fish from reaching their spawning grounds have in a measure compensated for the reduced run of fish by building roads which form the only means of access for anglers and have taken pains to stock newly completed reservoirs. The following letter from the managing director of the San Joaquin Light and Power Company is typical of the interest in fish conservation usually displayed by power company officials. The picture of conditions expected with further development is of particular interest to every angler.

FRESNO, CALIFORNIA, March 29, 1923.

MR. W. H. SHEBLEY,
c/o California Fish and Game Commission, Sacramento, California.

DEAR MR. SHEBLEY:

I have just read that part of your report of 1922, relating to the history of fish-cultural operations in California—especially that part of it on pages 94 and 95 that deals with the Merced and San Joaquin rivers.

I think you stated quite rightly the situation with reference to the Merced River, but I think you have overlooked in the San Joaquin River that the Miller & Lux and the Madera people are expecting to build a dam about half a mile above the station at Friant, that will be about 280 feet high. To impound the flood waters of the San Joaquin River will at times make the river entirely dry below the dam; that is to say, such seasons of the year as the water is not being used beneficially for irrigation, it will be impounded and the dam will back the water nearly up to the Kerckhoff Power House of the San Joaquin Light and Power corporation. After that is built, I do not think I am exaggerating in saying that there will be but a short period each year when any of the water from this stream will reach the bay; not only will the river be dry from Friant to the intake of the Miller & Lux ditches, above Firebaugh, but it will be dry from there to the mouth of the Merced, and when the Merced is reservoired, from there to the mouth of the Tuolumne River, and inasmuch as the Tuolumne is already reservoired at Don Pedro, it will dry the river from there to the mouth of the Stanislaus. As there are several big plans on foot for the storage of flood waters on the Stanislaus, it looks to me as though the only water that will be in the San Joaquin will be that amount that seeps in from the irrigation of the west side, through the spongy west bank of the river. So it looks to me as though any plan to perpetuate the streams referred to as breeding grounds for salmon are doomed, for the water must either be used for irrigation or the country will become as dry as the desert of Sahara.

These large reservoirs, however, will make it possible to develop wonderful fishing grounds for other kinds of fish. In our reservoir on the North Fork of the San Joaquin River, at Crane Valley, literally thousands of people are attracted by the fishing opportunities—just as they are at Huntington Lake, on Big Fork of the San Joaquin. While we shall probably have less salmon, we shall have more bass and trout, and I hope you will make it trout, as the bass are not a satisfactory fish with which to stock our big artificial lakes. People have gone up to Crane Valley with carp minnows for bait and the carp have gotten a start that supplies much of the necessary food for the bass; they are therefore not biting nearly as well as they did a few years ago.

Large reservoirs will also be built on Kings, Kern, Kaweah and Tule rivers, but none of these streams were ever noted as salmon streams; they will, however, make additional fishing grounds for other species of fish and will be a thousand times more beneficial to the people than the streams are at the present time, at the locations of these reservoirs. We may, therefore, lose our streams as salmon breeding grounds, but we will gain millions in population by the irrigation of

what are now dry lands by the impounded waters, and their pleasure in fishing where there is an opportunity to fish, will, I think, have to compensate for the loss of the salmon.

Very truly yours,

A. G. WISHON,

Vice President and Managing Director.

RESOLUTIONS.

Among the more interesting resolutions adopted at the Ninth National Game Conference assembled at New York City, December 11 and 12, 1922, were the following:

"WHEREAS, the American Game Protective Association is a recognized national leader in game conservation; and

"WHEREAS, a number of game associations in the western states have requested advice and assistance from the American Game Protective Association in their work of game protection; be it

"*Resolved*, that a conference be called at some designated point in the western part of the United States under the auspices and direction of the American Game Protective Association for the purpose of discussing problems pertaining to the western section of the United States and the organization of state game associations throughout that country.

"*Resolved*, That the National Game Conference of the American Game Protective Association calls renewed attention to the dangers threatened by the constantly increasing pollution of our waters by turning chemicals, oils and other waste into our streams and by the discharge of oil waste from incoming ocean steamers. Wild life thereby is frequently destroyed or driven away and the public health is seriously endangered. Federal and state legislation should be promptly enacted and enforced to end this enormous abuse.

"*Resolved*, That the National Game Conference of the American Game Protective Association heartily endorses H. R. 12143 providing for the establishment of an Alaskan Game Commission to protect game, land fur-bearing animals and birds in Alaska, and for other purposes.

"*Resolved, further*, That a copy of this resolution be furnished the Secretary of Agriculture, the chairman of the Committee on the Territories in the House of Representatives and the author of the bill, the delegate from Alaska.

"*Resolved*, That the National Game Conference of the American Game Protective Association is in hearty sympathy with the movement to lessen the destruction of our fur-bearing mammals and advocates the establishment by all the states of long, annual, closed seasons on fur-bearers and the licensing of all trappers and of all dealers in raw furs.

"*Resolved*, That as the National Game Conference of the American Game Protective Association heartily approves of the regulations of the Migratory Game Treaty relating to the shipment of game by nonresident citizens, it strongly recommends to the various states to amend their laws to agree with the federal regulations so that visiting sportsmen may ship without difficulty legally killed birds."—Bulletin of the American Game Protective Association, Vol. 12, No. 2, April, 1923.

CANADA'S INTRODUCED PARTRIDGES.

Discussing the successful introduction of Hungarian partridges in the Province of Alberta, Canada, and Spokane County, Washington, a writer in *Fins, Feathers and Fur*, official bulletin of the Minnesota Game and Fish Department, says: "The following plan used by the Alberta Fish and Game Association of Calgary, Canada, should be closely followed in this state. Mr. Fred Green of Calgary, in a letter to Mr. Holland (vice president, American Game Protective Association), says: 'The results we have obtained are far beyond our fondest dreams. The birds have multiplied and spread out so that they are now found in all directions from Calgary. The first planting of 195 pairs has increased to such an extent that a full month's open shooting season is now permitted with a season bag limit of 50 birds. The successful method of planting Hungarians is as follows: Fifteen pairs were put down in a favorable locality and then a circle was drawn, the edge of which would be about four miles from where the first lot were put down. We then liberated five pairs every mile or so around this circle. Later we enlarged this policy and planted more to the north and south, knowing they would follow our streams which run east and west.'"

EARLY GAME CONDITIONS IN THE GREAT VALLEYS.

The passing of Lyman Belding, a pioneer of Stockton, and the appearance of his biography by A. K. Fisher (*The Auk*, Vol. XXXVII, pp. 33-45), has brought to light some interesting descriptions of game conditions in the early days. He settled in Stockton in 1856, and in describing conditions he says:

"Game was abundant, including elk, antelope, deer, bear, otter, quail, and waterfowl. Elk have disappeared from

the interior valleys of the state excepting a drove on the Miller and Lux Ranch of forty thousand acres in the San Joaquin Valley, and these animals are being captured and distributed to various parks. The elk of this state inhabited the tule marshes mainly, though I have seen many elk horns in the Marysville Buttes, probably left there by elk which came from the marshes of Butte Creek, and I have seen hundreds, if not thousands, of elk horns on the border of the tule swamps north of Stockton. Antelope have entirely disappeared from the Sacramento and San Joaquin valleys. I saw three in the latter valley a few miles west of Princeton in the summer of 1870 and a single one in Lower California about twenty-five miles south of Tia Juana in the spring of 1887. Deer were mostly in the mountains, with a few along the rivers where there were extensive thickets on bottom lands. They will continue to be common with proper protection.

"Beaver and otter were plentiful in the sloughs and tule marsh about Stockton. Beaver built houses on the marshes as the musk-rats do on the marshes in the prairies of the Middle West. There were several of these beaver houses within three miles of Stockton. They were on land that floated, as much of the peat land does in the tule swamps about Stockton. I shot seven beaver in one day in the flood of 1861 and 1862. I would jar the houses and watch for the cautious appearance of the occupants as they came out to ascertain the cause of the disturbance. They would approach under water to within a few feet of me, just as I had often seen muskrats do when I was a boy, and the only evidence of their presence would be a little circular wave caused by their breathing, with only the tip of their noses even with the surface of the water. The beaver about Marysville burrowed in the banks of the rivers. Beaver and otter became scarce long ago.

"I went to Marysville to reside early in October, 1862. Small game was abundant. Myriads of ducks and geese came from the north and east of the Sierras in October and November. Butte Creek attracted most of them. The wood duck was very common on Feather River and was a constant resident. It is now, as in the country generally, quite rare. The mountain plover appeared abundantly on the plains in October. At present it is apparently on the verge of extinction. There were a few deer along Feather River below Marysville and a few in the Marysville Buttes. Mountain quail came down from the mountains near Oroville and other localities on the eastern border of the valley to spend the winter."

DEER DIE IN HUMBOLDT COUNTY.

The finding of a large number of dead deer in Humboldt County has led to wide discussion as to the cause of death. Newspaper items appearing in various papers of the county have attributed death to widely different causes. Some have maintained that death was due to a lung worm, some to hemorrhagic septicemia, and still others to "scours," a form of diarrhea. It seems doubtful whether there is sufficient evidence to point out any one of these causes as the one responsible. Unless post-mortems could be made by some capable scientist familiar with diagnosis, it seems doubtful whether the matter can be definitely settled.

SHARK MEAT SOLD AS "WHITE BASS."

It is understood that considerable quantities of shark meat, said to be mostly the flesh of the cat or leopard shark, *Triakis semifasciatum*, are being sold in the San Francisco markets under the name of "White Bass." While shark meat is wholesome and quite palatable when properly prepared, it is regrettable that it is not sold under its own name. Such practices may appear to offer an immediate and unusual profit, but ultimately inure to the injury of the fish trade. The exploitation of this meat is desirable, but it should be done without misrepresentation and at a reasonable price. The prevailing price in San Francisco is said to be 15 cents per pound. Successful experiments in salting and smoking shark meat have been conducted on the Atlantic coast.—Fisheries Service Bulletin, No. 94; March 1, 1923.

GROWING ACTIVITY OF CALIFORNIA FISHERMEN ALONG MEXICAN COAST.

In Bureau of Fisheries, Document No. 939, Mr. R. A. Coleman, an agent of the Bureau, gives many facts of interest concerning the fishing operations of California boats in Mexican waters.

Since no natural boundary mark exists between the United States and Mexico, from the earliest times of which we have records that California fishermen have ignored the line and gone south for their catch. Practically all of the fish taken in southern California waters can be found off the Lower California coast in greater abundance than farther north. Apparently the fish migrate to the warmer southern waters as the season advances,

and in many cases can be taken during the entire winter season.

Very favorable conditions for fish life exist along the coast of Lower California with its continuous "fishing shelf," with water less than one hundred fathoms deep and with its shoreline deeply indented by many small bays and lagoons.

"The yellowfin tuna, the bluefin, the so-called halibut, the barracuda, the white sea bass, the black sea bass, the yellowtail, the mackerel and others are found in greater abundance south of the line than off the California coast, and all these fish spawn in these southern waters. The albacore is the only one of these groups that has not been taken south of Cedros Island.

"What has been said of the abundance of fishes is also true of crawfish, turtles and abalones. The turtle is rarely taken north of the boundary line, and the others are so nearly fished out in the waters of the United States that the catch is small."

Eighty-five per cent of the sea crawfish or spiny lobster coming into southern California is brought from Mexican waters. The amount annually imported is estimated at about 4,000,000 pounds.

Practically all of the turtles (*Chelonia agassizii*), are brought to California alive from Mexico. They are at present captured alive at San Bartolome and Magdalena Bay, but the Gulf of California will be in future the chief source of supply. Fully 5000 turtles are imported annually. A turtle cannery in San Diego Bay has two vessels bringing in turtles, and the canning of soups and steaks is increasing.

The supply of abalone in California waters being practically exhausted, the take is now confined almost entirely to the Lower California coast. A Japanese firm of San Diego controls this business in the south and has camps of from five to ten men who move from place to place getting the abalone. The product amounts to from eighty to one hundred tons of dried meats per year, valued at about $700 per ton. Before the war abalone shells were in much demand in England and on the continent, and the trade is now reviving somewhat. At present the imports amount to from twenty to twenty-five tons only per year valued at $60 to $120 per ton. "Blister pearls" of considerable value are occasionally found.

As early as 1888 J. W. Collins in a report to the Commissioner of Fisheries, U. S. Commission of Fish and Fisheries, speaking of the fishing in San Diego County, mentions that fishermen go from 200 to 300 miles along the southern coast for bonito and barracuda, but it was not until about 1908 that the amount taken was of commercial importance. At first the fishermen were not interfered with by the Mexican government, but later patrol boats were put on, and at present there are Mexican agents in San Diego and San Pedro from whom fishing permits must be obtained and to whom catches must be reported.

In 1920 from sixty to sixty-five power boats operated in these southern waters, but during the tuna season only about half that number go south. This number is likely to be largely increased in the future.

"In 1918 the average take of fish in Mexican waters by California fishermen was 700,000 pounds per month, on which export duty of $3,500 was paid, boat charges, clearance, etc., being additional."

"It was estimated in 1920 that of the important food fishes brought into southern California the following proportions were taken in Mexican waters, the balance being secured north of the line.

	Per cent
Halibut (so-called)	80–90
Barracuda	75
Sea bass, white	60
Rockfishes	10

"Boats coming from Mexican waters frequently bring huge cargoes. In 1918 the Veribus Unitas entered San Diego harbor with 46 tons of fresh fish. Another boat brought in a 31 ton catch of barracuda and bonito."

UNITED STATES LEADS IN GAME REFUGES.

In commenting upon bird sanctuaries, the Spring Number 1923, of *Bird Notes and News*, a British publication, urges increased effort toward the establishment of national bird sanctuaries and wild-life reservations in order to prevent the reckless depletion of both birds and other fauna. In the establishment of national wild-life reservations the writer says that the United States and Canada have been leaders, and that Africa, Australia, New Zealand and India have made beginnings. Holland, thanks to the efforts of a number of eminent enthusiasts, has many fine bird sanctuaries, and in this respect is ahead of all Europe. Bohemia is taking steps toward the establishment of several national refuges, particularly for waterfowl. In Great Britain, although there are a few private and municipal sanctuaries, there are no national wild-life sanctuaries. Present laws make it

possible to forbid killing birds and taking eggs in certain localities, but since there is no provision made for guardianship of any kind, it is difficult to enforce such a prohibiting order. It is a hopeful sign that the subject is to be discussed at the International Conference which meets in Paris this summer.

CONDITIONS IN REFUGE 1D.

On April 30, a trip was made to the salt grounds within Game Refuge 1D in the Trinity National Forest. At an altitude of 8000 feet and in the timber on the north side of the mountain, snow was five feet deep, but there was no snow at all on the south slopes. The deer had already arrived and were gathering around the salt grounds waiting for their rations. Last fall, 200 pounds of salt were packed in and stored in the Lookout Station, so a supply was available. The deer proved to be very tame—they would just move out of the way and stand.

Several deer died last winter in Trinity County but I do not believe death was due to any contagious disease. All that I examined were very poor and were covered with ticks and lice. There was nothing in the stomachs or lungs of those examined to correspond with the malady of several years ago.

Quail were found about half way up the mountain, apparently following the feed.

The general outlook for hunting and fishing for 1923 is very good. The Forest Service has built many new trails and wagon roads, and with the expected completion this fall of the Hyampon-Hayfork road, Trinity County's hunting grounds will be open to auto travel. New signs using the old Indian name of Ghost Mountain have been conspicuously placed along the road from Hayfork to Hyampon. Each year finds the refuge more highly appreciated by the residents of Trinity County.—G. O. Laws, Douglas City, California.

PELAGIC SEALING PROHIBITED.

On April 9th, President Harding issued an executive order designed to protect from unlawful pelagic sealing, the herds of fur seals that annually migrate through Alaskan waters to the Pribilof Islands. This was done in pursuance of an act of Congress concluded in July, 1911, "to give effect to the convention between the governments of the United States, Great Britain, Japan, and Russia, for the preservation and protection of the fur seals and sea otters which frequent the waters of the North Pacific Ocean." Patrol of the waters by six boats of the Bureau of Fisheries is ordered and the masters of the vessels, together with a few other designated employees of the Bureau, are empowered to search any vessels of the United States suspected of violating the laws, and to seize and bring into port for trial, the officers and crews with the vessels. Fisheries Service Bulletin No. 96, further reports that in the

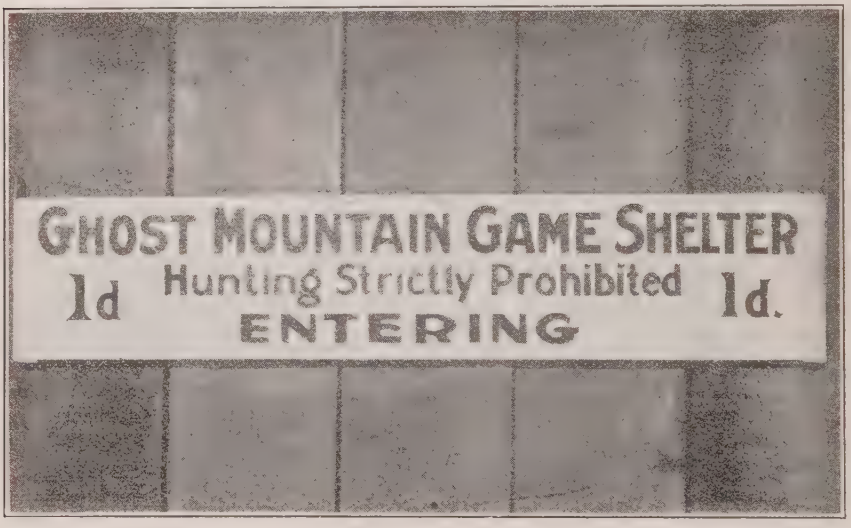

FIG. 29. New signs for the Trinity County Game Refuge.
Photograph by G. O. Laws.

12 days following the promulgation of the order, about 25 illegally taken skins were seized by three of the boats engaged on the patrol.

THE MIGRATION OF DUCKS.

There has been much speculation as to the breeding grounds of ducks wintering on Lake Merritt, Oakland, and in the great valleys of California. The practice of banding and releasing migratory birds, which is being carried on by numerous ornithologists and bird enthusiasts under the direction and supervision of the U. S. Department of Agriculture, is helping to solve the problems of where the birds go when they leave their nesting grounds and what routes they take. It is indeed the only means of getting certain and definite data regarding individuals or groups and the routes taken by them. There has been much more activity in bird banding in the eastern states than in the west, but Mr. J. Eugene Law, in charge of organization on the Pacific Coast, is authority for the statement that more than forty permits have been issued to banders on the Pacific slope.

In Bulletin No. 1145, of the U. S. Department of Agriculture, issued in May, 1923, Alexander Wetmore, of the Bureau of Biological Survey, gives the records of many birds banded in the Bear River marshes of the Great Salt Lake, Utah, where large numbers of migratory birds congregate. Mr. Wetmore was studying alkali poisoning among the birds of those marshes from 1914 to 1916, and during that period 1241 birds of 23 different species were banded. The majority of these were wild ducks comprising 9 different species. With the exception of a few birds turned over to the State Fish and Game Commission in 1916 for exhibition purposes and later released near Geneva, Utah, all of the birds banded were released near the mouth of the Bear River, Utah. Of this number, returns were received on 182 birds, a little over 14 per cent. Of the 994 ducks banded, 174 were retaken, giving a return of 17 per cent on the birds of this family. It should be stated that many of these birds had not bred in the vicinity as drake pintails and mallards begin to arrive there early in June and continue to come until late in the fall.

Distinct migration routes were traceable, one of which was southwest from the Salt Lake Valley to California, traveled by the green-winged teal and shoveler and some of the mallards and pintails. One group, made up of cinnamon teal, redhead, pintail and mallard, find their way into Texas by two different flight routes. The third route is a general drift southward over the Rocky Mountain Plateau to the scattering ponds and lakes of southern Utah, New Mexico and Arizona. Indications are that this route is followed by a smaller number of birds, including the snowy herons as well as some of the ducks.

The following tabulation indicates the species upon which returns were received and shows the number of each reported upon:

	Banded	Returned
Double-crested cormorant	1	1
Mallard	72	22
Gadwall	17	4
Green-winged teal	336	49
Cinnamon teal	45	5
Shoveler, or spoonbill	48	9
Pintail	221	34
Redhead	239	51
White-faced glossy ibis	104	1
Great blue heron	11	4
Snowy heron	83	4
American coot	18	1

Of the comparatively small number of mallards banded, about 30 per cent were afterward reported. One of these, banded September 24, 1914, was recovered October 16, 1916, nine miles south of Bishop, California. None of the gadwalls were traced to California, but of the 49 green-winged teal recovered out of the 336 banded, 19 were taken in California over a range extending from Yolo County to Orange County. None were taken north of Sacramento, two in Kern County, several near Los Banos, while on the coast two were taken in Orange County and one at Watsonville. As most of the others were killed near the place where they were banded, the conclusion was drawn that most of the green-winged teal which leave Utah winter in California. No cinnamon teal were recovered in California but one shoveler or "spoonbill" was taken near Vallejo, October 28, 1917, having been banded September 1, 1916. Since six of the nine banded were retaken in the same vicinity within a very few weeks, and two at other points in Utah, there is slight evidence that some shovelers come from Utah to California to spend the winter.

It is apparent that many pintails migrate to the interior valleys of California, for eight returns were made from an area extending from the marshes above Suisun Bay to a point south of Calipatria in the Imperial Valley. Boundaries of the various migration routes followed by the pintails recovered are indicated as being east as far as western Missouri and north as far as southern Saskatchewan, Canada. One of the pin-

tails banded lived four years after being released. None of the large number of redheads banded were retaken in California.

Among other interesting facts gained from the study was that out of 104 young white-faced glossy ibises banded in their rookeries only one individual was recovered. As this bird was marked July 3, 1916, and was found October 22, 1922, on the shores of Tulare Lake, a southwest migration movement from the Salt Lake Valley to California would seem to be indicated. The nests of snowy heron are found in colonies in the lower Bear River marshes where, on July 3 and 14, 1916, 83 nestlings were banded. Three of the four recovered were found in Mexico, the fourth in Arizona, upon dates that would indicate that these herons from the breeding grounds of Utah winter on the west coast of Mexico.

There are many other problems aside from migration routes, length of flights, ages of birds and so forth to be solved by bird banding, such as differences in plumage at various ages and at various seasons; whether the birds return to the same nesting sites; rate of growth; and diseases affecting different species as discovered by those cooperating in this work under the Biological Survey. As the practice becomes extended it is anticipated that much valuable data concerning western birds will be collected in this way, as has already been done in the east.

FIG. 30. Digging Pismo clams near Watsonville, California, April, 1923. Photograph by J. H. Hill.

SCIENTIFIC WORK OF THE COMMISSION APPRECIATED.

That the valuable studies of California fishes prosecuted under the administration of Mr. N. B. Scofield, in charge of the Commercial Fisheries Department, are of the very highest order and an accomplishment which promises soon to place California ahead of other states in respect to the care of her fisheries, is pointed out by Mr. Willis H. Rich, in charge, Division of Scientific Inquiry, U. S. Bureau of

Fisheries, writing in the *Stanford Illustrated Review*, for May, 1923 (p. 406). Mr. Rich also expresses anxiety lest the scientific work of the commission, pursued by Mr. Scofield's division and under the supervision of Mr. Thompson, should be discontinued for lack of funds. This, according to the writer, would be a calamity, not only to the scientific development of California fisheries, but also to the country at large.

LOUISIANA'S SUPERLATIVES.

In *Conservation News*, the bulletin of the Louisiana Department of Conservation, April, 1923, attention is called to the resources which Louisiana possesses in superlative degree. Pertaining to fish and game are the following interesting facts. In 1922 the value of the state's sea food products totaled about nine million dollars. The annual yield of the fur products of that state ranges between two and three million dollars. Louisiana is the possessor of the greatest public shooting ground in the world as well as the largest areas in the world where waterfowl and other forms of wild life are completely protected. No other state has an area suited to oyster culture as great as that of Louisiana—477,000 acres.

That these things are true is largely due to a broad-visioned, wisely-planned conservation policy to which sympathetic public support has been given. Back of it all lies education and publicity of the right kind.

NUMBER OF HUNTERS INCREASING IN UNITED STATES. HOW ABOUT THE GAME SUPPLY?

It is estimated that there are in the neighborhood of 8,000,000 hunters in the United States. During 1921–22, the number of persons in 46 states who purchased hunting or fishing licenses, or both, ran close to the 5,000,000 mark. Two states, Mississippi and North Carolina, had no fish and game commissions, (North Carolina has since organized one); in Delaware residents are not required to purchase a license; in Texas it is unnecessary to have a license for the county in which one resides; and in Florida reports are very incomplete because county judges are not required to make reports on license sales. According to the Department of Agriculture nearly 3,000,000 hunters are, for just such reasons, exempt from taking out a license. The National Sports Syndicate has for five years been gathering statistics regarding hunting and hunters and during that time they have found that the number of licensed hunters has increased at the rate of never less than 50,000 a year. It would be valuable to know whether the supply of game is being maintained in spite of this rapid increase of hunters, or is diminishing, or whether, possibly, due to game protection and propagation, regulation of the hunting season, law enforcement and other measures, game is increasing. Mr. Peter P. Carney of the syndicate suggests that it would be to the best interests of all concerned if every state fish and game commission would keep a record and send out figures on the number of licenses issued, the amount paid for them, the amount of game taken and, as nearly as can be determined, the amount of game remaining.

TREES AND BIRDS.

It has been shown time and time again that increased planting of trees furnishes attractive food, nesting sites and shelter for birds. Oftentimes the planting of trees has not kept pace with the destruction of trees. It is gratifying, therefore, to see the enthusiastic support given the plan to beautify the state's wonderful system of highways by tree planting. There are many sections in the great valleys where not a tree exists for many miles. Many a lonely country roadside will in the future be made more cheerful by the presence of a line of beautiful trees which give shelter to hundreds of song birds, due to the foresight of those promoting the planting of trees along the highways, in school grounds and parks, and in private gardens.

CHANGES IN FEDERAL GAME LAWS.

Amendments to the Migratory Bird Treaty Act Regulations, adopted by the Secretary of Agriculture and approved by the President on June 11, include a change in the season for hunting migratory waterfowl in Pennsylvania from September 16–December 31 to October 1–January 15, and in Oklahoma and that part of Texas lying north and west of the International and Great Northern and the Texas and Pacific Railroads from October 16–January 31 to October 1–January 15, while the season in southeastern Texas was changed from October 16–January 31 to November 1–January 31.

The open season for hunting doves in southeastern Texas was changed from September 1–December 15 to November 1–December 31, and in South Carolina from September 1–December 15 to November 1–January 31.

These changes were adopted at the solicitation of state game officials and interested sportsmen in the sections affected, and are believed to be in the interest of conservation.

Other amendments authorize the issuance of permits for propagating waterfowl and for scientific collecting purposes to be valid until revoked by the Secretary of Agriculture, thus obviating the necessity of renewing such permits from year to year to cover continuing operations. The latter amendments are designed to facilitate the administration of the law and regulations. Annual reports from permit holders will be required as heretofore.

TAKING BIRD CENSUSES.

A new government publication, Department Circular 261, The Purpose of Bird Censuses and How to Take Them, by May Thacher Cooke, assistant in biological investigations, has been issued by the United States Department of Agriculture, and is available on application to the Biological Survey or the Division of Publications, United States Department of Agriculture, Washington, D. C.

This publication is designed for persons now cooperating in taking bird censuses, also for ornithologists and others desiring information on the subject. In addition to an explanation as to the need of data regarding the numerical distribution of the various species of birds in different sections of the country, the circular gives instructions on how to make local counts, the time to begin, and the types of tracts from which censuses are desired. These include farm land, wood land, irrigation projects, marsh land, and other special areas.

Directions are given for rendering a report of each census when taken. Blanks for these records are furnished by the Bureau of Biological Survey.

ENCOURAGING CONDITIONS PREVAIL IN ALASKA IN 1922.

A spirit of public cooperation in respect to the conservation of wild life in Alaska is more widely marked than ever before, says Governor Scott C. Bone in his second annual report to the Secretary of Agriculture on the Alaska Game Law. Respect for the law is the rule, and the schools of the territory are cooperating by the use of a questionnaire on animals and birds.

Conditions touching animal and bird life in Alaska have been very favorable during the past year in the opinion of the governor. Game is said to be plentiful, and animal life of all varieties seems to be increasing.

Sentiment continues to favor removing the protection afforded the brown bear, which is a dangerous predatory animal. At Afognak last year three hunters met four ferocious bald-faced Kodiak bears and one of the hunters was killed. There are few black bears on the Alaska Peninsula, though they are plentiful and increasing in the Kantishna, Fairbanks, McCarthy, and Ketchikan sections.

Ptarmigan and grouse have shown gains, and geese and ducks are reported in numbers in the region of Lake Minchumina, according to the governor's report. Many fur-bearing animals are increasing, including a variety known as the tundra mink. Arctic hares are reappearing by thousands, as well as rabbits, and are doing considerable damage to planted areas. The depredations on fur bearers and game animals by wolves, wolverines, eagles, hawks, and coyotes, which also are increasing, seem to warrant stringent measures for their control. Fox farming on the islands of southeastern Alaska is proving profitable and popular.

One thousand dollars was paid to the territory for hunting licenses during the fiscal year ending June 30, 1922, and in addition, $300 was paid for special moose-shipping licenses and $290 for other licenses.

FACTS OF CURRENT INTEREST.

In March last, the collapsing of a municipal dock at Monterey precipitated forty cases of canned sardines into Monterey Bay. Most of the cases were salvaged after efficient work by the members of the fishing fleet.

Fishermen in Suisun and San Pablo bays who persist in setting nets or using illegal nets are gaining experience at high cost, for fines averaging $100 are regularly meted out.

The trout season opened auspiciously on May 1. Fishing has been remarkably good, due largely to the series of good years with a maximum of water and to the restocking operations of the Fish and Game Commission.

Educational work in the summer resorts is being continued in Yosemite National Park this year. Increasing interest in this educational program is very evident.

Striped bass anglers who sought legal protection for their night fishing activities will have to accommodate themselves to a new law with the same provisions in order to make law enforcement possible in connection with commercial fishing.

As evidence of the important part played by the automobile in increasing the toll of game taken, it may be pointed out that Deputy J. O. Miller counted forty-seven machines on the edge of the lava beds on the opening day of the deer season of 1922. All of these machines carried hunters interested in securing a mule deer.

HATCHERY NOTES.

W. H. Shebley, Editor.

THE SPAWNING SEASON.

Splendid success has attended the special efforts of the fishcultural department to obtain a large take of trout eggs for the hatcheries. The eggs taken have passed the 29,000,000 mark which means that this year's supply has exceeded that of last year by over 4,000,000. With the exception of floods at Lake Tahoe which washed out racks and interfered with operations for black-spotted trout, conditions have been very favorable. The Snow Mountain Spawning Station furnished an unusually large number of steelhead eggs. On the other hand, the take on the Klamath was 50 per cent below normal. The Feather River Hatchery, now practically completed, is operating with a capacity of 850,000 eggs. The Kaweah Hatchery contains 400,000 and the Wawona Hatchery has a like number. Spawning operations were still in progress on June 1st at the spawning stations in Plumas and Lassen counties. Operations at Rae Lakes have been postponed owing to the impossibility of crossing the high mountain passes.

BREEDING PONDS YIELD LARGE NUMBER OF EGGS.

A dependable supply of trout eggs is always available from the brood ponds at the Mount Shasta Hatchery. Nearly one-third of all of the trout eggs utilized in the state hatcheries are derived from brood fish. The season 1923 furnished 2,760,000 eastern brook, 5,270,000 Loch Leven and 1,500,000 brown trout, making a total of 9,530,000 eggs.

EASTERN BROOK TROUT EGGS IMPORTED.

An exchange of 1,000,000 Loch Leven trout eggs for an equal number of eastern brook eggs with the New Jersey Fish and Game Commission will furnish an added supply of pure eastern stock to the streams of the state. In the east, the Loch Leven is in great demand as it is thriving much better than other species in eastern streams where sewage disposal pollutes practically every stream. This species, along with the brown trout, seems to be especially resistant to disease. The rainbow has been found impractical under most conditions in eastern states.

MACKINAW TROUT SECURED.

For the first time in many years it has been possible to secure eggs of the Great Lakes trout, the species commonly called Mackinaw. One hundred thousand fry now thriving at the Mount Shasta Hatchery were planted in late June in Clear Lake, Lake County, and in Eagle Lake, Lassen County.

This species was introduced in California in 1894 when 93 per cent of a shipment of 100,000 eggs were hatched at the Sisson Hatchery. In May of the following year, 65,000 of these fry were planted in Lake Tahoe, the remainder being held for shipment the next season. At other times, lots of eggs were hatched at Sisson and the fry planted in the various lakes of the Truckee Basin. Coming from the lakes Superior, Huron and Michigan, these trout are adapted to the cold, clear waters of deep lakes and should grow to a large size in Lake Tahoe. They have not, however, thrived as have other introduced species. Many years ago some young were taken in Fallen Leaf Lake during spawning operations, but apparently spawning grounds are not suitable.

STEELHEAD AND RAINBOW TAKEN IN TAHOE.

Steelhead and rainbow trout introduced into Lake Tahoe two years ago appear to be thriving, for several weighing up to 1½ pounds were taken during spawning operations this spring.

BROWN TROUT TO BE PLANTED IN RUSSIAN RIVER.

The steelhead run in the Russian River is largely a thing of the past. The bar at the mouth of the river, which has precluded the entrance of fish, has been one important factor concerned. In order to furnish angling for the many vacationists who line its banks each summer, brown trout are to be introduced this year. This species should prove the best adapted for this stream. Rainbow are also to be planted but they will doubtless inhabit the higher reaches of the river. The brown trout thrives in the slower moving, warmer waters.

MANY SCREENS INSTALLED.

During six weeks in late spring, seven large rotary screens were installed in irrigation canals. Most of these were built in Sacramento.

CONSERVATION IN OTHER STATES.

ARIZONA SOCIETY INTERESTED IN PRESERVING HEATH HEN.

The Tucson Natural History Society, through its conservation chairman, Mr. Hugh G. Calkins, has expressed to the Director of the Massachusetts State Department of Conservation, the hope that a thorough investigation may be made to determine the cause of the reduction in numbers of the heath hen on the Island of Martha's Vineyard and to find, if possible, some means of successfully maintaining the species. Formerly abundant, there now remains of the heath hen a flock of only 150 individuals on the island. We agree with the Tucson society that thoughtful people everywhere, who are lovers of nature, will be interested in an effort to preserve the existence of this, or any other valuable or interesting species, wherever they may be, whose continued existence is threatened.

MICHIGAN AND THE BOUNTY SYSTEM.

Much has been written pro and con on the bounty system of controlling predatory animals. Recently, the State of Pennsylvania defended the system. The State of Michigan takes the opposite point of view and recommends the abolition of the system. In 1919 this state paid $124,446 in bounties on wolves. In 1922 the sum amounted to $36,043.50. The state comptroller states: "Personally, I do not believe that this bounty is a benefit to the state, and, doubtless, fraud is practiced. As the state has been paying bounty on wolves for twenty-five years and, instead of the number growing less, they seem to be increasing."

Furthermore, the expense of the bounty system has grown from $232 in 1870 to $371,236.44 paid in nine months of 1922. The sum of $1,100,000 has been paid in bounty claims since 1869. Numerous instances of fraud are said to show that, in spite of precaution, fraud can not be eliminated.

Although the government pointed out many years ago that bounty systems had proved expensive, ineffective and invariably conducive to fraud, yet many states still continue to spend vast sums on a bounty system.

NORTH CAROLINA VOTES DOWN NEW GAME BILL.

North Carolina and Florida are the only states without state-wide game laws. For the past twelve years repeated attempts have been made by conservationists to place North Carolina in line with surrounding states, but to no avail. Last December, the North Carolina Fish and Game Development League was organized to support a measure introduced in the legislature. When the game bill providing for protection of wild fowl and fur-bearing animals came to the floor, a dozen counties sought exemption and, in short order, the bill was laid on the table by a vote of 52 to 42. Thus was disposition made of the most recent attempt to establish an intelligent system of state enforcement of the bird and game laws.

TEXAS INTRODUCES BOB-WHITE.

According to the 1922 report of the Game, Fish and Oyster Commission of Texas, 1200 bob-white have been introduced into that state and favorable reports are being received continually.

A census of the antelope still remaining in Texas shows that there are about 547 individuals, all of which have taken to rough country where they are least molested. The very few mountain sheep which are left within the state are receiving adequate protection only where cattlemen who own the range take measures to keep out the poacher.

NEW MEXICO'S NEW GAME CODE.

In Mexico's new game code, enacted by the fifth legislative assembly, are numerous additions and amendments of outstanding interest. The alien gun law is a stringent one, making it "unlawful for any unnaturalized, foreign-born resident of New Mexico or of adjoining states, to use or have in possession, or under control within the state, any shotgun or rifle of any kind." A residence of five consecutive days in that or any adjoining state, causes any unnaturalized, foreign-born person to be considered a resident, and therefore liable to the penalties provided for violating any provision of the act. Night hunting, the use of high-powered rifles in the taking of migratory game birds, the killing of game with steel or hard pointed bullets or with any weapon other than ordinary shoulder guns or pistols is prohibited.

Certain plenary powers are given the commission which makes it possible to apply conservation measures promptly and avoids the necessity of waiting for legislative enactment as must be done in California. Among these are authority

to receive gifts or bequests of lands suitable for use as game refuges, hunting grounds, fish hatcheries or for other purposes in accord with the act; power to close hunting at all times or at certain times on designated areas in order to provide havens where migratory birds may rest and feed unmolested; permission is also given to close any public waters to fishing, for the purpose of protecting spawning grounds or recent plantings of fish, or to prevent the depletion of the supply of fish; to aid in reducing the danger of destructive forest fires, the commission is given authority to forbid hunting entirely at such places and times as extreme danger of forest fires exists.

MICHIGAN INSTITUTES CAMPAIGN OF EDUCATION.

In its last biennial report, the Department of Conservation of the State of Michigan outlines an intensive campaign of education and publicity conducted during the past two years. Activities have been confined to the display of motion pictures and stereopticon slides, lectures on nature subjects and conservation, and issuing of booklets, pamphlets and posters covering activities having to do with natural resources. Ten 1000-foot reels of motion pictures are in almost constant use. A large number of very attractive posters have been distributed throughout the hunting regions and many booklets have been issued. Elementary works covering the flora and fauna of the state are planned for the use of school children.

IDAHO REORGANIZES FISH AND GAME DEPARTMENT.

Governor C. C. Moore of Idaho has appointed Mr. R. E. Thomas, who for the past four years has been Assistant Chief Deputy Warden, as State Fish and Game Warden to succeed Mr. Otto M. Jones, resigned. Mr. Thomas is said to have an intimate knowledge of the work, and, added to that, a knowledge of the conditions confronting the farmers and stockmen, so that harmony is expected to exist between those who hunt and fish and those interested in ranching. The *Mountain Home* (Idaho) *Republican* quotes Mr. Thomas as saying: "We have reduced the number of field men about 25 to 30 per cent and it is now our aim to cut this force down to around 30 and put the money thus saved into propagating and preserving our fish and game resources. This means that local wardens will be cut out in some instances and no new wardens will be added. Our force will be so distributed that the state will be covered most efficiently and, with the cooperation of the people in helping us to cut down our number of employees, we will be able to have more funds for building up our resources.

LIFE HISTORY NOTES.

OSPREYS IN MODOC COUNTY, CALIFORNIA.

On May 20, 1922, in company with U. S. Game Warden R. C. Steele, the writer made an auto trip between Malin, Oregon, and Clear Lake Reservation, California. This country is rolling, rocky, arid desert land, sparsely covered with a growth of juniper and sagebrush.

During the trip, four nests of the osprey (*Pandion haliaetus carolinensis*) were noted in juniper trees ranging approximately from 25 to 35 feet in height. Three of these nests were examined and two of them contained three eggs each, while one other was about completed and ready for its compliment of eggs. The fourth nest was not examined, except from the ground. One nest containing three eggs also contained a sucker about twelve inches in length, which had evidently been brought from Clear Lake, about eight miles distant.

None of these nests was closer than about five miles from open water. Three of the nests were saddled in the forks of stout limbs, while the fourth nest was built on the very topmost branches of the juniper about twenty-five feet high. The upper limbs of this tree were dead and the nest could be seen from a long distance. At all four nests, both parent birds were present and at two nests the parent birds were assisted in their demonstrations by their neighbor ospreys.—STANLEY G. JEWETT, 515 P. O. Bldg., Portland, Oregon.

REMARKABLE FLIGHT OF HAWKS.

On April 17, 1923, a very rainy day in El Dorado County, my attention was called to a flight of hawks, believed to be Swainson hawks (*Buteo swainsoni*), passing over my place on Lotus Road, near Placerville. The flight continued for a half hour and by 2. p.m. the main part of the flight was over. At least a thousand birds were included in this migration. My brother, who also witnessed the flight, left for Placerville while it was in progress and stated that a much larger number passed over "Thompson Hill," a range of hills to the east. The stomachs of specimens taken were examined by Dr. H. C. Bryant and found filled with black crickets (*Gryllus* sp.). If the entire flock had fed upon the insects, as it is reasonable to suspect, the birds undoubtedly rendered a valuable service to the locality from which the crickets were collected. It would be interesting to know how far the hawks had traveled and when and where they had secured the crickets.—GEORGE WILLIAMSON, JR., Placerville, Cal.

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JANUARY, FEBRUARY AND MARCH, 1923.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Glenn, Colusa, Tehama	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego
Albacore												1,064			1,064		
Anchovies										5,300		10,537			15,837		
Barracuda											150	74,755	904	105,363	181,172	785,232	172,008
Bluefish										3,960					3,960		
Boccaccio								24,555	92,821	311,220	4,937				433,533		
Bonito										3,325		25,269		2,850	31,444	38,489	16,812
Carp		12,185		1,894		7,367	13,800	76							35,322		
Catfish		34,283				3,497									37,780		
Chilipepper								15,448	66,990						82,438		
Cultus Cod	2,398							95,047	7,042	31,720				2,728	138,935		31
Dolphin																	
Eels														55	55		
Flounders	13,719		12	49			5,146	150,099	14,972	1,280		27		172	185,476		140
Grayfish								70,695				1,827		50,580	123,102		
Greenfish																	
Hake								1,290							1,290		
Halibut								2,966	627	762	74,680	347,225	28,750	80,130	535,140	170	158,604
Hardhead						5,608									5,608		
Herring	2,501		24,435				65,637	175,052	158						267,783		
Kingfish									33,682	11,725		76,733		2,274	124,414	122	135
Mackerel									10	74,796	2,467	466,976	30,932	71,385	646,566	30,311	2,940
Marlin																	
Mullet																	
Perch	25,063		16,849	108			19	11,388	171	13,505	404	503		6,654	7,157	9,882	14,928
Pike				107		432	1,575	6				37,500	47	729	105,783	22,114	1,165
Pompano								562		14					2,120		
Rock Bass												1,897			2,383	5,456	1,912
Rockfish	150							168,072	118,187	375,813	27,865	35,846	1,732	6,801	44,379	8,054	3,248
Sablefish								47,901	11,008			627,056	21,782	226,592	1,565,517	515	8,534
Salmon	281		2,422	26,214	42,160	18,300	22,242	285,123							58,909		
Sandabs								327,958		80		3,312	5		396,742		
Sardines								3,880	175	18,560,635	1,060	52,741,012		3,664,531	331,355		
Sculpin												13,212		2,635	74,971,293		
Sea Bass—Black												5,974		11,647	15,847		
Sea Bass—White								17	247	18	29	32,628	1,012	52,750	17,621	4,234	75,989
Sea Trout														481	86,701	92,914	16,600
Shad				1,028		4,424	26,382	3,889	49						481		21,450
Shad—Buck				3,799		1,484	23,604								35,772		
Shad—Roe				5,645		972	30,023	5							28,887		
															36,645		

Sheepshead												65	1,859	34	19,531	21,489		75
Skates								51,271		665			2,002	188		54,126		
Skipjack																		2,270
Smelt	4,131		7,281					37,470	616	551	33,739		98,939	2,536	6,163	191,426	1,075	870
Sole	50							1,796,998	8,393	9,705	21,827		71,237	920	5,565	1,914,695	95	209
Splittail						13,100										13,100		
Striped Bass			585	21,434	119	31,414	187,630	17,557		13						258,752		
Stingaree													365			365		
Suckers						273										273		
Surf Fish																		70
Swordfish								13,231								13,231		
Tomcod																		
Trout—Farm																		
Trout—Steelhead													27,580			27,580		
Tuna																		16,823
Tuna—Bluefin																479		
Tuna—Yellowfin																3,937		
Turbot			479															
Whitebait	1,705		135					2,057		40			2,256		5,890	8,146	371	2,085
Whitefish													44,341	420	70,188	114,949	139,256	197,959
Yellowtail																		
Miscellaneous		4,700		1,027			670	23,631	1,581	1,653	9,413		24,390	174	536	67,775	2,041	2,997
Total Fish	49,998	51,168	52,198	61,305	42,279	86,871	376,728	3,326,244	356,729	19,406,780	176,636		54,776,232	89,436	4,396,230	83,248,834	1,140,331	717,854
Crustaceans:																		
Crabs	[1]142,680	[2]3,744	[3]10,680				[4]120	[5]294,000	[6]1,056	[7]216						452,496		
Ecrevisse																		
Shrimps			32,428					199,999								232,427		
Spiny Lobsters											26,121		54,348	4,645	40,273	125,387	11,300	355,753
Mollusks:																		
Abalones			40							80,295	7,707					88,042		
Clams—Cockle	3,390		10,841										3,076			17,307		
Clams—Mixed	5,856		2,422													8,278	397	400
Clams—Pismo									720		52,387					53,107		
Clams—Softshell		490	16,880				41,083	12,412								70,865		
Cuttlefish								4,718	16,782	20,798						42,298		
Limpets																		
Mussels							280	1,345	50	790	35			1,000		3,500		
Oysters—Eastern			[8]210,234													210,234		
Oysters—Native																		
Snails																		
Squid										120			76,630		925	77,675	4,381	
Miscellaneous:																		
Frogs																		
Terrapins																	785	1,050
Turtles																		
Totals	201,924	55,402	335,723	61,305	42,279	86,871	418,211	3,838,718	375,337	19,508,999	262,886		54,910,286	95,081	4,437,428	84,630,450	1,157,194	1,075,057

All amounts shown in pounds. [1]5,945 doz. [2]156 doz. [3]445 doz. [4]955,608 shell oysters. [5]5 doz. [6]12,250 doz. [7]44 doz. [8]9 doz.

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